

British Society for the  
Study of Orthodontics.  
1927.







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TRANSACTIONS

OF THE

**British Society for the  
Study of Orthodontics**

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1927

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THE MEETINGS are held at the ROOMS of the MEDICAL  
SOCIETY OF LONDON, 11, Chandos Street, Cavendish Square, W.1.



# The British Society for the Study of Orthodontics

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A MEETING of the Society was held at 11, Chandos Street, on January 17th, 1927. Mr. H. C. HIGHTON gave his presidential address.

## PROBLEMS IN ORTHODONTIC PRACTICE.

By H. C. HIGHTON, L.D.S.R.C.S.Eng.

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I WISH to thank you for the great honour you have conferred upon me, in electing me your president for the ensuing year. I feel that I have accepted the honour rather with fear and trepidation, well knowing my many failings and shortcomings, which I trust you will overlook, and ask you to lend me all your help and support.

The subject of an inaugural address has been my first difficulty, and not having had the opportunity, or perhaps the ability, to carry out any original research, I thought I would bring forward this evening what appear to me to be many of the problems which present themselves in the study and practice of orthodontics. I am doing this in the hope that perhaps it may give rise to a discussion, and also evoke from some of the members, suggestions that might be useful in eliminating some of these problems, as it appears to me that on all sides there is so much that is still problematical.

In the first place, I shall refer to the time when the Society was formed in 1907 with the title of "The British Society for the Study of Orthodontia," which strikes one as a happy inspiration, since the title explains itself and the objects of the Society, which title is more applicable to day than ever. Many members of the Society at the time of its formation were keenly interested in the subject, but treatment was very varied, and no really definite conception of diagnosis or prognosis was possible. Dr. Angle had given us a classification and suggestions for treatment which were perhaps the most advanced and scientific then known, and were probably the first to stimulate general interest, although there were other classifications and many methods of treatment in use at that time; but even in those days Angle's suggestions were by no means generally accepted and were very widely criticised. It has always been the object of this Society to approach the subject with an open mind, and to refrain from dogmatising with regard to either cause, effect or treatment, and I trust I shall not appear to do so in any of my remarks this evening. We all realise that the majority of the early discussions in this Society, and also the general reports of proceedings from nearly every source, dealt principally with treatment, which usually was of rather an empirical nature. It was the latter fact which encouraged the necessity for discussion and inquiry into the possible causation of the deformities with which we are so familiar, with always the hope that a more definite and scientific method of procedure could be adopted.

In the intervening years we have explored a great many of the



issues involved in the various branches of orthodontics, which is leading to a much greater clarification of the subject, but we are still a long way from agreement on many points which arise, and this is always a healthy sign in the study of any subject. Increased knowledge often involves additional complications in diagnosis and treatment, whereas a mere mechanical knowledge of how to move teeth ignores the added responsibility of the various factors to be considered. There is no doubt, however, that the more complete study of our subject, and the broader conception now possible may eventually simplify our treatment, though it will undoubtedly add to the importance and perhaps complication of diagnosis. We have now arrived at a period when it is possible to consider some of the important problems of the subject which present themselves as outstanding features of research, and which will be a guide for future study. It is, I am afraid, only a very superficial survey that I will attempt, and you must excuse omissions which may appear to be more important.

I just wish to make a reference to classification which apparently is still a very debatable question, and is also by no means uniform. We have always had in general use Angle's original classification, which is simplicity itself, which fact probably accounts for its popularity, but it has failed in exactness, and we are still groping to a great extent in the dark with regard to the term normal occlusion. As applied by Angle it is probably looked upon as not being altogether a correct working basis, and one now has to accept a modified view of Angle's conception of normal occlusion. Hellman and others have clearly demonstrated that this was only a hypothetical basis for the study of occlusion. To take for example a simple illustration, which is often quoted, we have a range from edge to edge to a deep overbite, which cannot rightly be described as abnormal, and also very many other variations of what were at one time looked upon as abnormalities. There is as yet no definite idea of normal occlusion, except within a range of fairly wide variations, which conception will probably have to be accepted for some considerable time. I am not going to attempt a description of the various classifications, many of which are well known and in general use, nor has the time arrived when we can formulate an ideal classification. Le Roy Johnson states that after careful thought it is considered by many, that the idea of classifying in mass is rather antagonistic to the principle of diagnosis in the individual case.

Diagnosis which is allied to classification, we probably know to be one of the most important considerations which presents itself at the present time, particularly from a practical standpoint, and probably holds the key to the solution of many of our problems. Diagnosis includes a very wide field of study, as regards development, race, dietetics, evolution, heredity, habit, and numerous other factors, all of which contain so many of the problems still unsolved, consequently it is usually approached from the individual viewpoint, not always leading to satisfactory conclusions, and often involving complicated diagrams and systems of measurement, many of which are undoubtedly useful, but usually nearly impossible to the general practitioner. This, however, does not lessen their value, but does entail the necessity of again having a correct hypothesis if we are



to accept their conclusions. We have always had schemes of measurement, and methods for pre-determination of the arch, which latter have been admitted to be unscientific, but we have very recently had suggestions, which have explained the difficulty of compiling reliable statistics of measurements of arches or models for the purpose of later comparison, and the impossibility of measuring from supposed fixed points in any one tooth.

The question of diagnosis must include a consideration of the studies it embraces of which development is the most important. Many of us did not realise what it meant to practise orthodontics in the early days, and the question of development quickly forced itself upon our notice. Development again includes the study of pre-natal and post-natal influences, the latter including dietetics, evolution, heredity, etc., but in making a comparison of cases we must not forget that another complication arises, namely, that at one time variation meant abnormality, but the rate of growth is not uniform in individuals, or in different regions of the individual, and there is a wide range of variability in the ages of the eruption of the teeth. Pre-natal influences must involve many problems of which we are not cognisant and are certainly controlled to a great extent by the health and occupation of the parents, the latter fact being particularly evident in hospital cases. Again, the diet, nutrition and metabolism of the mother must be seriously considered in regard to calcium and phosphates all through pregnancy, in the latter seven months of which period the occlusal two-thirds of the deciduous teeth, and the occlusal one-third of the permanent molar are formed. Pre-natal treatment also involves a consideration of the healthy or septic condition of the mouth of the mother, which may have an effect on the developing foetus, as evidenced by the improvement in health after the extraction of septic teeth. This is often strikingly illustrated when the same plan is adopted as post-natal treatment in cases where the mother is feeding the child. Here again the improvement in the health of the mother is observed, and the increase in weight of the child, which is the usual index to its state of health ; conversely the great difficulty and often impossibility of the mother to suckle the child where there is a marked degree of oral sepsis.

Diet or nutrition has perhaps the greatest influence on development and involves so many problems, and is such a debatable subject that one almost hesitates to bring it forward, but here at least the consensus of opinion is in favour of eliminating certain deleterious foods, and obtaining what might be termed a more rational diet. There is no doubt the question of diet is extraordinarily important, and it is being constantly discussed ; and research has been carried out much more thoroughly and keenly during the last twenty years than at any previous period. It is tending to revolutionise treatment in many spheres of medicine, and is of more than ordinary interest in the study of orthodontics. I think it is generally agreed that caries of the teeth and inflammatory disease around the teeth and gums are largely due to faulty nutrition and other dietetic errors, which frequently and unfortunately often present themselves at a very early age, and which also largely accounts for lack of development of the mouth as well as other parts of the body. What appears to be an outstanding



example of faulty nutrition, but which may bring forth an expression of opinion from some of the members, is that whilst sugar is probably a good food when taken with a meal, its excess creates a definite insufficiency in the diet, by creating an appetite for that particular food, and supplanting the more substantial calcium bearing foods. Its use between meals is recognised as both a local and general menace, because of the gastro-intestinal and oral fermentation it induces. I think it has often been stated in this Society that children are frequently encouraged to like and eat a diet which is deficient in calcium and phosphates, and generally lacking in vitamins, and they are actually being fed on a diet which induces rickets. I know you are all acquainted with the recent statements in the Press on the tremendous increase in the consumption of sugar. Apart from the question of caries, this cannot help us in the prevention of malocclusion.

We are all familiar with Dr. Sim Wallace's valuable communications on this subject, but in latter years we have had the question of the vitamins and internal secretions very much to the forefront. There is no doubt that this recently acquired knowledge of the internal secretions, and the chemical composition of food will eventually lead to a use of this knowledge which may solve many problems which present themselves. Various methods of alteration in diet have been described during the last few years, a review of which it would be superfluous for me to discuss, but it appears to be more than reasonable to assume that research in this direction also is going to prove one of the most useful and valuable adjuncts to treatment. A statement that is often controverted and I suppose invites criticism, but is called forth by experience of work at a welfare centre, is that it appears to be a very important fact regarding the nutrition of the child that it should be breast fed. It would therefore often seem easy to account for the many difficulties that are met with in attempting to adopt cow's milk to the needs of the child.

The question of heredity has always been a matter for discussion, and again probably accounts for many of our problems and difficulties in treatment, and there seems to be a tendency at present to accept the suggestions of many investigators that this is a very important factor in development, diagnosis, and the possibility of successful treatment. The subject has many times been more or less relegated to the background, but has not only survived, but is continually forcing itself to the forefront, and a better conception of its importance, or otherwise, would be of the greatest value. We are all acquainted with the fact that biology limits the possibilities of heredity being a factor to be considered amongst our difficulties, but in the process of evolution we get adaptations and variations which may be due to environment, but heredity may have a greater effect upon the production of many of the conditions that arise than has previously been considered probable. Apparently irregularity of the teeth is not by any means a modern condition as is generally supposed, but probably dates back many centuries. Many times in the course of practice we see cases which appear to be striking examples of heredity, where a child presents a condition resembling post-normal occlusion, the mother also having a similar deformity. Upon inquiry and examination it transpires



that other children of the same family have well formed arches, and no evidence of anything but perhaps a very slight degree of malocclusion. The child often proves to be a persistent thumb sucker, and the mother admits to having herself suffered from the use of a dummy teat. The whole subject is so much involved in the question of environment and habit, that at present it seems to be impossible to differentiate. The Society issued last year a questionnaire, with regard to family histories, together with models and other relevant material, for which, I believe, Mr. Chapman deserves great credit. Although the information so gathered may not prove anything, it opens up a field for research, and it may be the means of throwing a certain amount of light on the question of the influence of heredity on development.

In concluding the scattered remarks I have made upon the problems which arise in connection with diagnosis, another of some degree of importance which presents itself in established cases always appears to me to be that there should be taken into consideration the state of health of the patient—whether of the robust or delicate type. This is not always obvious from a casual examination, but entails the necessity of obtaining the history of the method of feeding, and the frequency of illnesses, and other general disturbances, which might have an effect on the ultimate results of treatment. It would be interesting in the treatment of our cases if such a history were known and a comparison of results made, as it might probably show that it is with the robust type that we gain our greatest success.

The use of appliances has almost been universal in the correction of cases of malocclusion up to the present time. In recent years has arisen, however, one of the most important problems in orthodontics, which is the outcome of the study of the various branches of the science. I refer to the question of prevention, and the possibility of eliminating as far as possible the use of mechanical devices. Prevention naturally demands the greatest attention and is rapidly assuming an importance which may lead to its attainment becoming more probable. The prevalent idea in this problem would appear to be that of getting back to normal if one may so describe the tendency to study cause and effect to the extent of bringing into prominence this question of prevention. By normal in this conception is probably meant the average type of functional occlusion, which does not omit the possibility and necessity of extraction under certain circumstances. To make any progress in this direction it will be necessary to have the full co-operation of the parents, and to be able to make a thorough inspection of the child at regular intervals, and preferably from a very early age. It is probable that a great majority of malocclusions have their origin during the period of development, during the ages of two to six years, or even perhaps earlier. This statement one recognises must of course not preclude the question of heredity or other antenatal influences. The deciduous teeth we are beginning to realise are perhaps more important to study in this connection than the permanent teeth. They function when growth is most rapid and developmental changes most marked and at a time when habits, etc., are being formed either beneficial or otherwise. Important work in this direction and which I should again like to commend to



your notice is that of A. P. Rogers of Boston, and I trust you will forgive the reference, as it has been brought forward so frequently at recent meetings, but we cannot help being impressed by its possibilities. He is endeavouring to eliminate as far as he is able the use of appliances, by carefully studying habits and abnormal muscular force, and making the effort to stimulate these in the right direction, also overcoming in the earliest stage any lack or hindrance to development. Prescribing specific muscular exercises in an attempt to modify the osseous structures of the jaws, and encouraging the normal processes of mastication and respiration, and following the correction of abnormalities by means of appliances, that every effort should be made to insure the normal function of the surrounding parts. This involves a knowledge of the normal development and function of the masticatory apparatus, the ability to recognise variations from the normal caused by the more obvious things, such as mouth breathing, pernicious habits, and the lack of the normal stimulus of thorough mastication, which latter we have for a long time considered to be an important point.

We have also in this connection recently had presented to us Friel's excellent communication on the influence of the musculature of the face and jaws. He fully explained the importance not only of the muscles of mastication as comprised by the temporal, masseter, and the internal and external pterygoids, but of the orbicularis oris and the facial muscles radiating therefrom, and the muscles of the mouth and tongue. I had not previously referred to the importance of habit in diagnosis as it appeared to be a problem particularly associated with the question of prevention. Habit we know to be a normal function: the majority of ordinary and every-day actions develop into habits, and these normal habit movements help to bring about normal growth and relations of the associated parts, but abnormal habits are connected with many complicated conditions and often extreme cases of malocclusion. pernicious habit, and to successfully deal with the problem of A more or less natural function perverted often results in a habit as a cause of malocclusion we must endeavour at an early stage to differentiate between normal and abnormal. We have all had experience of the fact, also it is so often quoted, that habits develop more readily in some children than in others; and we are only too well acquainted with neurotic children who particularly tend to develop pernicious habits such as thumb and finger sucking, lip biting, etc., which cause a perversion of correct development. With all the progress that has been made in orthodontics, there is always the problem of the neurotic child who is lacking in self-control and composure, and we are cognisant of the fact that despite tact, gentleness and patience, we know how troublesome they are to deal with. Here is a condition where research is important: if we could diagnose the cause of this condition and too frequent perversion of development, we could probably eliminate many of our difficulties. It has been suggested that faulty nutrition, lack of fresh air and exercise and lack of discipline, might offer an explanation in many cases. It is also obvious that malocclusion cannot be prevented unless nutritional processes, nervous and muscular functions are guided on right lines, but from experience we know that these suggestions do not afford the complete ex-



planation. We now at least recognise that habits will bring about conditions which will afford many examples of the far-reaching and definite effect on growing bone of abnormal muscular tension, and the unrecognised and unconquered habits are a potent cause of failure in retention and illustrate the necessity of a more accurate diagnosis.

Habit, function and nutrition would appear to be the principal factors to be considered in connection with the question of prevention. There is no doubt that a great deal of light has been thrown on the subject, and on what may prove to be many of the fundamental causes of irregularities of the teeth; and we cannot help but appreciate and admire the value from a scientific standpoint of the work on the musculature of the face and jaws, and of the influence of habit and nutrition on development, and the labour that has been entailed in elucidating the facts presented to us. It is still, however, far from possible to lay down any hard and fast rules, as from studies of the etiology of malocclusion which have been presented to us many apparently contradictory facts arise, but we have many guides for inquiry that should at least be most helpful, and should eliminate many of our difficulties.

Although problems and difficulties present themselves in attempting classification and diagnosis, they appear to be also evident when we come to the practical side and the use of appliances. There is by no means any generally accepted method of treatment, each individual having to formulate his own ideas, and there is a great diversity of opinion with regard to technique and the type of appliance to be used. We could hardly say that there is a dearth of methods or suggestions, as the variety in number of appliances is almost unlimited, but the success obtained by their use is not the only consideration. We are all aware that deleterious effects can be produced upon teeth and mucous membrane, which are more or less permanent, and far outweigh any advantage obtained from the mechanical success of the treatment. We have as a guide the oft repeated principles laid down in recent years, as to the ideal requirements that should be embodied in the devices, together with its degree of adaptation to the variety of cases with which we meet. So far as I can gather the essential requirements appear to be that the appliance should be of such a nature that it will be acceptable to the tissues with which it is in contact, since the tongue, lips and cheeks play such an important part in mastication, and should interfere with their function as little as possible. The appliance should also not interfere with physiological tooth movement, and should be rather a stimulus to development than a mechanical device. How far we can apply these ideals is a problem which many are attempting to solve, and the evolution of the orthodontic appliance has perhaps been as great in the last twenty years as anything in dentistry. We all remember the heavy bulky appliances of the early days of practice in this branch of our work, and the tendency has always been to get away from the cumbrous devices and those that exert too great a force, and to simplify as much as possible the mechanics of tooth movement. I should like here to make the suggestion, that it is always as well to remember in connection with the use of orthodontic appliances, that although they may help and stimulate growth, the reverse is also the case. Mere



force is nowadays not sufficient for our purpose as we are obtaining more knowledge of its nature, direction and reaction. From an investigation and use of various appliances and devices, such an appliance that most nearly fulfils the ideal requirements appears to me to be the lingual arch with its accessory springs and various attachments, also its modifications when used in conjunction with the bite plane, etc. We have always had two principal methods in use, together with the many variations of each type, namely, the fixed and movable appliances, and also combinations of both principles, all of which have their advocates, but probably there is no advantage in tying oneself rigidly to any particular method. The lingual arch, however, would appear to combine the essential advantages of both methods, and although its use is not entirely universal, it can be adapted to the majority of cases and has the great merit of obviating the use of ligatures and the necessity of fixation of the teeth. Another method which also would appear to answer the requirements but with a more limited use, which has not received a great deal of attention and has not often been discussed or referred to in this Society, but always appears to warrant more importance than has been given to it, is the use of the lingual arch as described by Lourie. This was evolved from the lingual arch as used in retention where the passive arch is made active by the use of wire stretching pliers. The important part being that the beaks of the pliers must be cylinders of the same circumference that are parallel at the finish of the pinch. For cases of simple expansion it is often an invaluable appliance, its advantages being ease of construction, the simplicity with which it moves teeth and its inconspicuousness. I am afraid I have not had much experience in its use, but many excellent results were shown amongst the cases exhibited by Dr. Oliver at the B.D.A. annual meeting in 1925.

Whether the advantages claimed for the use of the lingual arch in its various forms will be substantiated is a matter for experience to decide, and we can only hope that it will eventually be superseded by the ideal appliance or preferably by prevention. A point which perhaps requires elucidation in the use of any form of lingual arch is the fact of a certain amount of fixation of the second deciduous molar or the first permanent molar, as the case may be, and more especially when used in conjunction with the buccal arch. In view of the information recently imparted by Prof. Brash in his paper on the direction of the eruption of teeth, one has to consider whether the natural processes are to any serious extent interfered with by the attachments to the molar teeth. As an offset against this, you are all acquainted with the suggestion of Mershon, that in the treatment of any case it is always advisable to give rest periods, any relapse only meaning that force has been applied in excess of possible development at that period, and is probably a blessing in disguise. There appears to be no doubt that the more rigid fixation of the majority of the teeth which is necessary in the use of more complicated appliances must necessarily greatly interfere with the natural process of bone growth. There is a great opportunity in the use of devices to endeavour to be able to estimate the amount of force applied.

I was greatly interested in an apparatus shown at the Orthodontic



Congress to record the pressure exerted by springs. The lightest force of a small accessory spring apparently exerted a pressure of about two ounces, which is an astonishing fact, and rather invites the question as to the amount of pressure which ought to be used. I expect the force exerted by some heavy devices would reveal the fact that far too great a strain is being placed upon teeth.

The question of how to move teeth is not difficult to answer, the problem which so often presents itself is a knowledge of the desirability and extent of tooth movement. The former idea of placing teeth in normal occlusion gives rise to the question not only of what is normal, but also desirable in the case of the particular individual. The safe guide is probably to minimise the extent of movement within the range of a careful diagnosis. Here it would seem again that the much debated question of extraction must always be seriously considered, especially where normal development is much interfered with. Consequently to restore functional activity might be all that ought to be attempted in many cases, and I think the relapse which so often occurs and to which I must plead guilty to have experienced with cases on several occasions, is due to the fact that the tissues would never be able to support and maintain a more or less ideal result.

Probably the question may have arisen in the minds of many of the members why I have dealt with these various aspects of the subject. It is because I feel convinced that the present trend of thought is that in the diagnosis of orthodontic cases we know that they do not resolve themselves into a scheme of classification and treatment on purely mechanical lines, that it is much more than a mechanical problem, and entails strict inquiry into detailed causes of abnormalities and the reason for the condition. One fact is certainly obvious, that the increasing tendency for the abnormalities of the masticatory mechanism so common at the present day is due to a perversion of the functions which are necessary to insure normal development. It would appear, however, that our investigations have at least fortunately enabled us to recognise, if not to correct, many of the causes which seem to be partially responsible for the perversions which arise.

How often do we attempt correction of malocclusion without sufficient thought or thorough diagnosis as to probable origin, hence lacking a true conception of treatment. Although we may begin to operate without a careful diagnosis we are most concerned about the ultimate result, and the line of action taken must determine the success of treatment. We all know that little things are sent to try us, so are the big ones, where orthodontic treatment is concerned, and it may transpire that we have made a big mistake as easily as a small one, and we have then reached the beginning of the end so far as success can be determined if a careful consideration of all the problems involved has not been the result of our diagnosis.

In conclusion I should like to again refer to my opening remarks with regard to the position of the Society at the time of its formation, when the subject of orthodontics was practically in its infancy, and was just emerging from the problems of general dentistry as a serious and special study. It appeared as though there might possibly be only a very limited field for research and discussion,



and that the study of orthodontics was probably not so important or impressive as the exchange of ideas and discussions in other branches of dentistry. We have been in existence as a Society for nearly twenty years, and have only opened up problems which still require elucidation. The whole subject of orthodontics is still anything but clearly defined, and we are merely beginning to find our starting-points, and to evolve our ideas in the study of this great science, which includes and embraces problems which will interest the dental profession in its entirety, and will entail a vast amount of work for many years to come.

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### **"THE STORY OF A FAILURE."**

By W. A. BULLEID, L.D.S.

(*Illustrated on page 22.*)

MR. BULLEID craved pardon for climbing into the pulpit when, he said, his proper place would be the penitent's bench. When he received the Secretary's circular letter asking for Casual Communications it occurred to him that possibly it might be a source of some little amusement to those present and of much profit to himself if he induced a discussion on one of his failures.

Quite unblushingly, therefore, he was going to show a case that he had had under treatment for some four years with a result that even a most partial friend would only characterise as deplorable.

Perhaps he might just chide the Secretary for quite spoiling the title of his short paper by substituting for it the chilly and colourless sentence on the agenda. A good title covered a multitude of sins. Those of them who had seen Barrie's delightful play, "What Every Woman Knows," would remember Maggie peptonising John Shand's speeches. Where he had insipidly written something about "Stemming the flood," she at once transmuted it into "damming the torrent." Well, what he had written was, "What would you have done?" or "The Story of a Damned Failure." He hoped that members would tell him what they would have done in treating this case, and why it was such a failure. Apart from the question of treatment, the case had one or two points of intrinsic interest. The first was that had the child been seen at about 5 or 6 years of age; then treatment would have been comparatively simple and probably fairly successful. As it was, she was 13 years of age when he first saw her. She was the youngest of a family of five children; he knew the mother and three of the other children. They all showed exactly the same deformity, though to a lesser degree. They were certainly not physically robust, being of a lank weedy habit. With one exception, they were organically sound but poorly developed. There was



therefore a definite family history of the same malocclusion in one parent and at least three other children, and he thought only a bold man would deny a hereditary causative factor in this case; he was convinced of it himself. Some might remember that last year he showed two cases, when he ventured the opinion that in them heredity played no part in producing the malocclusion, that the cause lay in some obscure factor local in its incidence and effect, and that the deformity, though excessive, was confined to the alveolar bone and arches.

He based this conclusion on the fact that restoration to normal was very easily and quickly attained, and that little or no tendency to relapse was manifest, his argument being that it was inconceivable that a deep-seated hereditary malformation would respond to treatment so readily. In the case presented the exact opposite was the fact. There was a definite family history of similar deformity. The teeth were very resistant to movement, and the tendency to relapse was excessive. He was dealing with a condition in which the whole of the bones of the face were involved and not the alveolus only.

The more cases he saw the more he was becoming convinced that orthodontic cases fell broadly into two classes. (1) Those in which a hereditary or at least a pre-natal factor was the predominating cause, and in which the deformity involved the whole of the maxillary bones at least, and not the alveolar only. Resistance to tooth movement was great, and the tendency to relapse most marked, the formation of new bone being very slow. This type of case seemed to give the best result if treatment was undertaken before the eruption of the permanent teeth. (2) Those cases in which the deformity was confined to the alveolus alone, the disturbing element, whatever it may have been, being quite local both in incidence and effect. These cases seemed to him to respond easily to treatment, and did not relapse readily.

Turning to the models, the first, dated January, 1922, showed the imperfectly developed lower jaw and the marked underdevelopment of the alveolus in the molar region. The upper incisors reached well below the cervical margins of the lower, so excessive was the overbite. The retrusion of the left upper incisor only was curious, and he could not account for it. The first mistake he made was in not X-raying the case. He did not realise for some time that all four second bicuspid were congenitally absent. Treatment commenced with ribbon arches having bracket bands on upper and lower incisors, the arches being adjusted to depress both sets of front teeth into their sockets and intermaxillary elastic applied.

In December, 1922, things were as in the second model, and he began to think he might accomplish something. As there were no signs of the second bicuspid, he X-rayed and found them to be absent. Clearly the only thing one could do was to raise the bite and retract the upper incisors. To this end he removed the upper arch and put in a bite-plate. The next model showed the state of affairs in April, 1923. Then he made his next mistake when he got impatient and reverted to intermaxillary traction, with the lack of result shown in the fourth model, in October, 1923. Of course, he realised he had "got the wrong sow



by the ear," and that it was futile to try and do anything save concentrate on raising the bite and encouraging growth in the molar region. He therefore put a vulcanite plate in the lower to maintain the lower incisors in place and to fill the gap of the missing bicuspid and reverted again to the bite-plate in the upper. The next model was taken in September, 1925, and showed some growth movement in the posterior alveolus. What little, if any, there was had been stimulated by the eruption of the second molars. The incisors, however, had relapsed. He added a finger spring to the bite-plate to retreat the right ones, and in April, 1926, things remained as in the next model. He did not think any marked change had occurred since then.

Altogether there had been some slight improvement, but it was a pitiful state of affairs. Like the poor, this person would be always with him, only it was he (the speaker) who would be the poor. She would always have to wear a plate in the lower, and probably in the upper too.

### Discussion.

The PRESIDENT said that they had all had their failures in treatment and their successes, and they had found that it was often possible to learn more from the presentation of a failure than from the presentation of a success. They were much indebted to Mr. Bulleid for bringing forward this communication. He would like to ask him whether there was any habit which might bring about the deformity.

Mr. CARL SCHELLING said that Mr. Bulleid on a previous occasion had instanced a success, and this evening he had given them the other side of the picture. A patient 65 years of age came to him long ago and told him the treatment which he had had in his early days from Hamilton Cartwright, who made for him a vulcanite biting-plate completely covering all his lower molars and bicuspid. Since then he had periodically eaten down this old bite-plate and came to have it raised as he had nearly come down to his natural molars, and his front teeth were ground down almost to the level of the gum, but he had lived a very happy masticating life. This man only spoke of Hamilton Cartwright's skill in treating him in the way he had done. He hoped that Mr. Bulleid's patient, when she also came to be 65, would similarly praise the care with which she had been treated by him.

Mr. MAXWELL STEPHENS said that Mr. Bulleid's description of the two classes of cases met with might well stand. It was quite obvious that many cases that were thought to be extremely difficult worked out very readily, and those expected to be easy sometimes proved the reverse and subject to relapse. With regard to the case in question, the movement of the back molars was obviously the right thing to undertake to start with. One error, of course, as Mr. Bulleid admitted, was in not having secured radiograms. Occasionally owing to circumstances that mistake was made, and one got "caught out." As the second premolars were missing, there was no support in that region, and inevitably the bite must collapse again as soon as the retention appliances were taken off. In that case he thought that a bridge over the premolar space on the left side would assist in overcoming the difficulty; he wondered if Mr. Bulleid had thought of following that line of procedure. It might have been possible to have depressed the upper incisors in their sockets. He did not think that Mr. Bulleid should feel pessimistic, as looking at the first models, more had been achieved than he seemed to think. He agreed with a previous speaker and it looked to him as if the position of the three upper incisors on the right side might have resulted from a habit of the child, such as putting the thumb there, which had forced them into that position.



Mr. J. H. BADCOCK thought that they all learned more from their failures than from their successes, and he himself had had many opportunities of so learning. He thought that Mr. Bulleid was handicapped in the first instance by the age of his patient. Thirteen was an unlucky number, and a very unlucky age at which to begin orthodontic treatment. Although one might move the teeth very often fairly readily, it was exceedingly difficult to retain them in their new positions at that age, and he had given up all attempts at expansion when the patient was as old as in this case. Mr. Bulleid had raised one or two important points. One was that they should undoubtedly, as a routine method, X-ray their orthodontic cases. He had not himself done so until quite lately, but it had been borne in upon him that it was the proper thing to do, and it would prevent the accidents that now and then happened when the absence of members of the permanent set was overlooked. He gathered that this was a post-normal bite, but he was not quite sure. He was not in favour of the bite-plate for the reason that it acted only when the teeth were in apposition, and the teeth were in apposition very little—only, indeed, when eating, for in the ordinary position of rest they were not in apposition. In a case which was at all difficult he much preferred the more active method of depressing the teeth by means of springy arches, which did the work very efficiently indeed. Mr. Bulleid asked for an explanation of the protrusion of the teeth on the one side and retrusion on the other. The speaker wondered whether the lip had anything to do with it; in some cases the upper teeth closed inside the lip on one side and outside the lip on the other, and, of course, it make all the difference. It was just a possibility in this case. He also thought with Mr. Stephens that Mr. Bulleid need not be too pessimistic about his case. He had improved it a great deal.

Mr. BULLEID desired first to thank the members for the extremely polite way in which they had treated his paper. It was very kind of Mr. Stephens and Mr. Badcock to think he had improved the case. He would not say that he had not improved it to a certain extent, but he was not at all proud of it. Mr. Schelling had referred to a method of covering the posterior teeth with vulcanite and raising the bite in that way. He supposed it would have had the effect of improving the appearance in front. It did not commend itself to him in this particular case, for it would have been a handicap for the child to wear. He was pleased to hear Mr. Stephens appreciate his tentative classification. He had proffered it with some diffidence. It was based only on personal observation, and not on scientific data. Of course, his (Mr. Badcock's) suggestion for bridging the gaps would meet the question of relapsing, but somehow or other the speaker had got a constitutional objection to mutilating sound teeth, and it would have mutilated at least four in this case. So far as habit was concerned—and this applied to Mr. Badcock's remarks as well—he was not aware of any history of habit in the child, but it was a possible explanation that the habit of leaning on the arm had depressed the incisor teeth on one side, or possibly it had been brought about by lying in bed in the same way, which had produced pressure on that side. It was very stupid of him not to have X-rayed the jaws from the first. However, he had X-rayed them as soon as he began to be suspicious. He could not agree with Mr. Badcock that the bite-plate was an inefficient method of raising the bite. He had had some extraordinary success with young children in using the bite-plate, and almost nothing else, in promoting growth in the posterior alveolar region and a definite drift forward in the lower jaw. His experience was driving him to use the bite-plate more and more, with or without arches. He had been struck by what Professor Brash had said at a previous meeting about the alveolar growth, and it seemed to him that the bite-plate would assist that materially. The retrusion of the front teeth was not due to the lip being on the other side of the teeth, but



was due to some more obscure reason. He wished to thank them again for the very kind way in which they had received his communication ; the penalties had not been very severe.

A MEETING of the Society was held at 11, Chandos Street, on February 7th, 1927. Mr. H. C. HIGHTON, President, in the Chair.

## REPORT OF THE NOMENCLATURE COMMITTEE.

*Members of Committee :* Norman G. Bennett (Chairman), Harold Chapman, Sheldon Friel, George Northcroft, A. T. Pitts, Bertram Samuel (Secretary).

TERMS OF REFERENCE.—To consider the present systems of nomenclature used in orthodontics and submit proposals for their unification.

It was decided by the Committee that the matter before it could conveniently be considered under the following headings :—

1. NOMENCLATURE OF TEETH AND THEIR MACROSCOPIC ANATOMY.
2. DEFINITIONS OF ORTHODONTIC TERMS.
3. NOMENCLATURE OF APPLIANCES AND TREATMENT.

### I. NOMENCLATURE OF TEETH AND THEIR MACROSCOPIC ANATOMY.

ADOPTED TERMS FOR GENERAL USE				ALTERNATIVE TERMS	EQUIVALENT TERMS BUT REJECTED.
<b>TEETH.</b>					
Right or left.	Upper or lower.	Deciduous or Permanent.	Central Incisor.	Maxillary or Mandibular 1st Incisor.	Medial, Median or Mesial Incisor.
R or L	U or L	D or P	Lateral Incisor	M or M 2nd Incisor	Distal Incisor
R or L	U or L	D or P	Canine		Cuspidati Cuspid or Eye Teeth
R or L	U or L		1st Premolar		1st Bicuspid
R or L	U or L		2nd Premolar		2nd Bicuspid
R or L	U or L	D or P	1st Molar		Milk, temporary or 6 year old
R or L	U or L	D or P	2nd Molar		Milk, temporary or 12 year old
R or L	U or L		3rd Molar		Wisdom Tooth
Cheek Teeth (all teeth posterior to the canines)				Teeth of Molar series	Back Teeth



DENTAL FORMULÆ.

										e	d	c	b	a	a	b	c	d	e												
										8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Upper					
R																					L										
										8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Lower					
										e	d	c	b	a	a	b	c	d	e												

SUGGESTED SIGNS.

O = Unerupted.	/ = Lost.
E = Congenitally absent.	X = Lost prematurely.
□ = Retained too long.	Λ = Erupting.

ADOPTED TERMS FOR GENERAL USE.	ALTERNATIVE EQUIVALENT TERMS TERMS. BUT REJECTED.
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DIVISIONS OF A TOOTH.

Crown.	
Cervix.	Neck.
Root.	Fang.
Apex.	Prong

AREAS AROUND A TOOTH.

Cervical area.	
Radicular area.	Radical area.
Apical area.	

SURFACES OF CROWN.

Labial for	c b a	a b c	
	3 2 1	1 2 3	Mesial.
	3 2 1	1 2 3	
	c b a	a b c	

ADOPTED TERMS FOR GENERAL USE.	ALTERNATIVE EQUIVALENT TERMS TERMS. BUT REJECTED.
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Buccal for	e d	d e
	8 7 6 5 4	4 5 6 7 8
	8 7 6 5 4	4 5 6 7 8
	e d	d e

Medial Distal Lingual for	}	e d c b a								a b c d e								Palatal.	
		8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8		
		<hr/>																	
		8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8		
			e d c b a								a b c d e								

Incisal edge.	
Morsal.	Occlusa
Approximal—relating to contiguous surfaces of adjoining teeth. Medial and distal surfaces.	Proximal.
The terms medial, distal, buccal and lingual are used also to express tooth relationship.	

The terms normal, pre-normal, post-normal, buccal and lingual are used to express arch relationship.

Neutroclusion  
Distocclusion.  
Mesioclusion.

(a) *Deciduous Molars.*

*First Upper Molars.*

Medio-buccal cusp.  
Disto-buccal cusp.  
Lingual cusp.

*Second Upper Molars.*

Medio-buccal cusp.  
Disto-buccal cusp.  
Medio-lingual cusp.  
Disto-lingual cusp.  
Supplemental medio-lingual cusp.

Tubercle of  
Carabelli.

*First Lower Molars.*

Medio-buccal cusp.  
Disto-buccal cusp.  
Medio-lingual cusp.  
Disto-lingual cusp.

*Second Lower Molars.*

Medio-buccal cusp.  
Disto-buccal cusp.  
Distal cusp.  
Medio-lingual cusp.  
Disto-lingual cusp.

ADOPTED TERMS FOR GENERAL USE.

ALTERNATIVE EQUIVALENT TERMS  
TERMS. BUT REJECTED.

(b) *Permanent Teeth.*

*Premolars.*

Buccal cusp.  
Lingual cusp.  
Where 2nd Lower  
Premolar has two  
lingual cusps.  
Medio-lingual cusp  
Disto-lingual cusp

Palatal.

*Upper Molars.*

Medio-buccal cusp.  
Disto-buccal cusp.  
Medio-lingual cusp.  
Disto-lingual cusp.  
Supplemental medio-lingual cusp.

Tubercle of  
Carabelli.



*First Lower Molars.*

Medio-buccal cusp  
 Disto-buccal cusp.  
 Distal cusp.  
 Medio-lingual cusp.  
 Disto-lingual cusp.

*Second Lower Molars.*

Medio-buccal cusp.  
 Disto-buccal cusp.  
 Medio-lingual cusp.  
 Disto-lingual cusp.

Grooves, fissures and sulci and embrasures as in Black's Nomenclature, except that "medio" and "medial" are used instead of "mesio" and "mesial" respectively.

## RIDGES.

Marginal ridges.  
 Triangular ridges  
 Oblique ridges.  
 Transverse ridges.

## 2. DEFINITIONS OF ORTHODONTIC TERMS.

*Maxillary Base.*

That part of the maxilla and pre-maxilla upon which is superimposed the alveolar portion containing the teeth.

*Mandibular Base.*

That part of the mandible upon which is superimposed the alveolar portion containing the teeth.

*Alveolar Portion.*

That portion of either the maxilla and pre-maxilla or of the mandible that contains the roots of the teeth.

*Note.*

These three terms are used in a descriptive sense and not with any morphological significance.

*Dental Arch.*

The projection on a horizontal plane of the curve formed by the edges of the incisors, the cusps of the canines and buccal margins of the molar surfaces of the premolars and molars of either jaw.

*Vault.* (Rejected term—Transpalatine arch).

The longest palatal border obtainable through a coronal section of a maxilla

## DENTAL ARCH RELATIONSHIP.

The dental arches are in relation to one another when the teeth are in occlusion.

The relationship of either arch to the other arch may be normal, post-normal, or pre-normal, in an antero-posterior direction, and normal, buccal, or lingual in a transverse direction. The conditions may be bilateral or unilateral.

*Note 1.*

That only the relationship of the arches to one another as a whole is being considered. Neither variations in the curve formed by the teeth projected in a vertical plane, nor the excess or deficiency of overlap of the incisors nor lack of contact of the cheek teeth are included.

*Note 2.*

Abnormal movement of a tooth or teeth due to local causes may occur ; in deciding arch-relationship, such teeth must be imagined restored to their position.

## OCCLUSION.

The relationship of the teeth of the maxilla and mandible when the jaws are closed and the condyles are at rest in the glenoid fossæ.

## IDEAL OCCLUSION.

A hypothetical standard of occlusion based on the morphology of the teeth.

## NORMAL OCCLUSION.

That occlusion which is within the standard deviations from the ideal.

## ARTICULATION.

The contact relationships of the teeth of the maxilla and mandible which occur during the movements of mastication.

## DISPLACEMENT. (Rejected term—Gression and trusion.)

The malposition of the crown and root of an individual tooth to an equal degree and in the same direction. The prefixes medio-, disto-, bucco- or labio- and linguo- to "placement" indicate the direction of displacement. The prefixes supra and infra to "placement" express the idea of a tooth displaced in a vertical direction.

## INCLINATION. (Rejected term—Version.)

The rotation of a tooth around any transverse axis. The prefixes medio-, disto-, bucco-, or labio- and linguo-, are used with "clination"; the prefix employed being derived from the tooth-surface concerned.

## ROTATION.

The turning of a tooth around a longitudinal axis. The prefixes to designate the direction of rotation of a tooth are a combination of the terms medio or disto with either labial or buccal or lingual. The terms medio- or disto- give the surface that has moved and the terms labial, buccal or lingual give the direction of rotation. Malpositions may be varying combinations of displacement, inclination and rotation.

## IMBRICATION.

The overlapping of teeth in the same arch.

## SEPARATION.

The spacing of teeth in the same arch.



## RELATIONSHIPS BETWEEN THE DENTAL ARCHES AND THE MAXIL-LARY OR MANDIBULAR BASE.

In an antero-posterior direction the relationship between either arch and its base may be (*a*) normal (*b*) pre-normal, (*c*) post-normal ; in a transverse direction the relationship may be (*d*) buccal, (*e*) lingual.

### 3. NOMENCLATURE OF APPLIANCES AND TREATMENT.

#### ANCHORAGE

is a point of attachment at which the force of re-action produces little or no movement.

#### RECIPROCAL ACTION

implies movement at two or more points of attachment produced by the forces of action and re-action to varying extents according to the resistance encountered. (Rejected term—Reciprocal anchorage.)

#### BANDS

Clamp.

Soldered—(*a*) Lap bands.

(*b*) Pinch bands.

#### SIMPLE ANCHORAGE

is that form in which the resistance is supplied from one tooth.

#### COMPOUND ANCHORAGE

is that form in which the resistance is re-inforced by other teeth.

#### Bows.

Buccal, lingual.

Mr. NORMAN G. BENNETT presented this report of the Nomenclature Committee, of which he was Chairman. He said that on reading over the report, which was in the hands of members, he came to the conclusion that there was very little to say about it, and perhaps the less said the better. He would like to say, however, that the Committee really worked very hard, had several meetings, and had produced what he thought was a workmanlike report. He did not know whether the Society wished to take a discussion on the report as a whole or in detail, but perhaps he might make a few remarks on certain points. On the section referring to the nomenclature of teeth and their macroscopic anatomy there was not much to be said. The dental formulæ used were the usual formulæ, and the suggested signs the usual signs. The terms for the divisions of a tooth which the Committee had adopted were those normally in use and seemed to be most logical. There was evidently a misprint whereby the term "radical area" was stated to have been both adopted and rejected. As for the surfaces there was nothing particular to say. "Morsal," comparable as it was with "incisal," was thought to be a better term than "occlusal." The American term "neutroclusion" it was decided to reject, because what was represented was a normal condition. He had nothing to say with regard to the adopted terms for the cusps : they were the usual terms. Passing to the definitions, there was a good deal of difficulty in defining "vault," but the definition which the Committee had brought forward was brief and, he thought, really described what "vault" meant, but if any member could furnish a better definition he would be only too pleased. A great deal of time was spent over the terms "ideal occlusion" and "normal occlusion." Normal occlusion, of course, represented an average. If a large



number of cases of what was regarded as normal occlusion were taken they would be found to be not all exactly alike, but with certain minor variations. Hellman had made investigations on this subject and shown by mathematical expressions what these variations or deviations amounted to. It was thought best, therefore, to define the ideal occlusion, something which practically never existed, as an hypothetical standard, and normal occlusion as the average of those cases which differed from ideal occlusion only within standard limits of deviation. The term "displacement" was now in fairly common use; the terms "gression" and "trusion" had been rejected. The same thing occurred with regard to "inclination"; the continental terms "version" and so on were considered, but were thought to be on the whole not so good as those in use in England. A good deal of discussion took place over "anchorage," which was defined as a point of attachment at which the force of reaction produced little or no movement. It was desired to avoid the fallacy of pretending that anchorage was a fixed point. Anchorage was never a fixed point because the forces of action applied were equalled by the forces of reaction, and unless the anchorage was something which could not be moved at all—and this was never the case in the mouth—there must always be some actual or potential movement. The term "reciprocal anchorage" had been rejected for the same reason: in neither case was there any anchorage at all. His duty as Chairman of the Committee was rather to answer questions than to describe more fully what had been already put before the Society very clearly in the report, and he hoped that members would express themselves freely.

Mr. GEORGE NORTHCROFT said he had the honour of being appointed chairman of the International Committee on Nomenclature of the First International Orthodontic Congress which took as its basis for discussion the B.S.S.O. unpublished report. This committee worked chiefly by correspondence, and the time at its disposal in New York was very short. It consisted of Drs. Dewey, Hellman, Hoffman, Chiavaro, Quintero, Subirano and G. Northcroft as chairman. The report he presented met with a somewhat mixed reception. The criticisms were, from his point of view, rather unnecessarily drastic, and he did not think that across the water they had quite the same keen appreciation of the meaning of words that we had over here, and were fond of introducing cumbersome and complicated words which were perhaps unnecessary. At the very start, unfortunately, a clerical error led to some misunderstanding. Upper and lower teeth should be expressed by a small "u" or a small "l," so that "right upper" would be denoted "Ru." The committee thought it wise to put the alternative terms "mandibular" and "maxillary" in the first place, and to have the terms "upper" and "lower" as alternative terms. One member of the International Committee very strongly objected to the term "cheek teeth," but it was pointed out to him that it was used very much by the American anthropologist Gregory, and was a term which had come into common use; but to meet the objection it was placed as an alternative term to "teeth of molar series." He could clear up the difficulty to which Mr. Bennett had alluded about "radical area." The Committee decided that it should be called the "radicular area," and "radical area" was rejected: it was a printer's error by which the same term was put in both columns. To his surprise the Americans accepted the terms "premolar" and "canine" without any quibble at all. The Committee fell foul of those favourite terms, on this side, for occlusion—"normal," "pre-normal" and "post-normal." They pointed out with some degree of reason that in the report the terms "neutroclusion," "distocclusion" and "mesioclusion," were set out as equivalent terms which had been rejected, and that "normal" and "neutroclusion" were not synonymous terms, so the terms "post-normal" and "pre-normal" were rejected. They were very anxious in America, instead of the terms "medio-



buccal-cusps " and so on, to introduce right away the terms used in Osborn's nomenclature—"hyper-cone," etc.—but it was pointed out that these terms were not at all clear when referring to the cusps of the temporary molars, and that the farthest they could go was to put them as alternative terms. The Committee said that was wrong, but on returning to England the chairman took the responsibility of placing Osborn's nomenclature in the second position as alternative rather than as the adopted form. Then the definition of "dental arch" was objected to. In the report "dental arch" was defined as "the projection on a horizontal plane of the curve formed by the edges of the incisors, the cusps of the canines, and buccal margins of the morsal surfaces of the premolars and molars of either jaw." Hellman was quite convinced that "dental arch" simply meant the arch formed by the crowns of the teeth. The chairman asked him how thick or thin this particular arch could be, and so on, but he was determined that there was such a thing as a dental arch apart from an arch form. It did not seem to make very much difference, so it was decided that the "dental" arch was formed by the crowns of the teeth, and the "dental arch form" was what the B.S.S.O. called the "dental arch." The International Committee accepted the terms "displacement" and "inclination," and turned down the terms "gression," "trusion" and "version." The Committee was prepared to accept a slight modification of the definition of occlusion, viz. finishing with "when the condyles are 'passive' in the glenoid fossa." There was a wordy argument on the question of "anchorage" and "reciprocal anchorage," and he was sorry that his powers of persuasion were so limited that he could not get the Committee to see that there was not such a thing as reciprocal anchorage, and could not be. He suggested that if the U.S. ship *Minnesota* was anchored to the earth, the earth might stabilise the ship, but the ship would not stabilise the earth. It was decided finally to cut out the whole of the nomenclature of appliances and treatment. It was thought that the nomenclature of appliances was very inadequate, perhaps because in American textbooks the terms "pliers," "planes," and things like that were defined, which over here they casually took for granted. Mr. Northcroft added that he would like to read a letter he had received from Dr. Chiavaro, who made one suggestion which he wished to recommend to the Society and to the Nomenclature Committee—namely, the use of the term "vestibular" instead of "buccal" or "labial." One could always speak of the vestibular surface of the teeth instead of their labial or buccal surfaces, and he thought the term a very good one. The letter was received too late to incorporate in the work of the International Committee. He thought the letter was interesting as showing the keen interest that some members of the profession took in nomenclature. In reference to the term "bows" at the very end of the report, that was a term originally suggested to take the place of "arch," but it was subsequently decided, he thought, and was overlooked in printing, that the desirable term was the American one "alignment wire." This had some disadvantages, because it was not always an alignment wire, but "bow" seemed quite a good term, and he did not think it really mattered which term members used, though his preference was for "alignment wire."

The PRESIDENT said that they were greatly indebted to the Nomenclature Committee. He had read the report through himself, and it appeared quite clear and simple. There had been so many loose terms in use which did not convey the exact meaning that he thought it was well to have suggestions for uniformity, and the majority would agree that this was desirable, otherwise literature on orthodontic subjects would be confused and lacking in that degree of accuracy which it ought to convey. He suggested that he was probably only expressing what would be the wish of the Committee and the Council that these terms should be used where possible in future communi-



cations. He did not know that there was anything he could criticise in the report. The definition of the mandibular base, he supposed, in the light of the information they had had recently from Professor Brash, hardly conveyed the whole meaning. Normal occlusion seemed to be debatable for evermore. Then, with regard to the term "bow" to which Mr. Northcroft had just alluded, personally he would find it rather difficult to use the term, but he could quite see that it was a better term than the term "arch." The report was well worth studying and trying to follow out in their Communications. It had been circulated to members, and he was sure there were some who would like to make a comment.

Mr. CALE MATTHEWS said that the Society was extremely grateful to the members of this Committee, and to Mr. Norman Bennett and Mr. Northcroft in particular. Was the report to be received and adopted forthwith, or would it come forward for further discussion? Was it a pious resolution? It was one of the most epoch-making and devastating things that had ever happened since orthodontic nomenclature and classification began. It would uproot in the minds of many men an established phraseology and nomenclature, and they would have to begin again. Those who were teaching the subject were naturally anxious to know whether this was to go forward from the Society as an established nomenclature for the British Isles and for the schools, and also for orthodontic teaching generally. What was the position with regard to students, examining bodies, and fellow practitioners? He thought this report should be digested and then come forward for discussion from the general professional orthodontic outlook. He was saying nothing in criticism, but he wanted to know where he and those of them who were teaching were supposed to stand in regard to the phraseology already accepted (some of it admittedly under protest) by the orthodontic practitioners.

The PRESIDENT said that this report was brought forward as a definite suggestion for the use of terms in the future and to be a basis for use in that Society. He would not commit himself further than that.

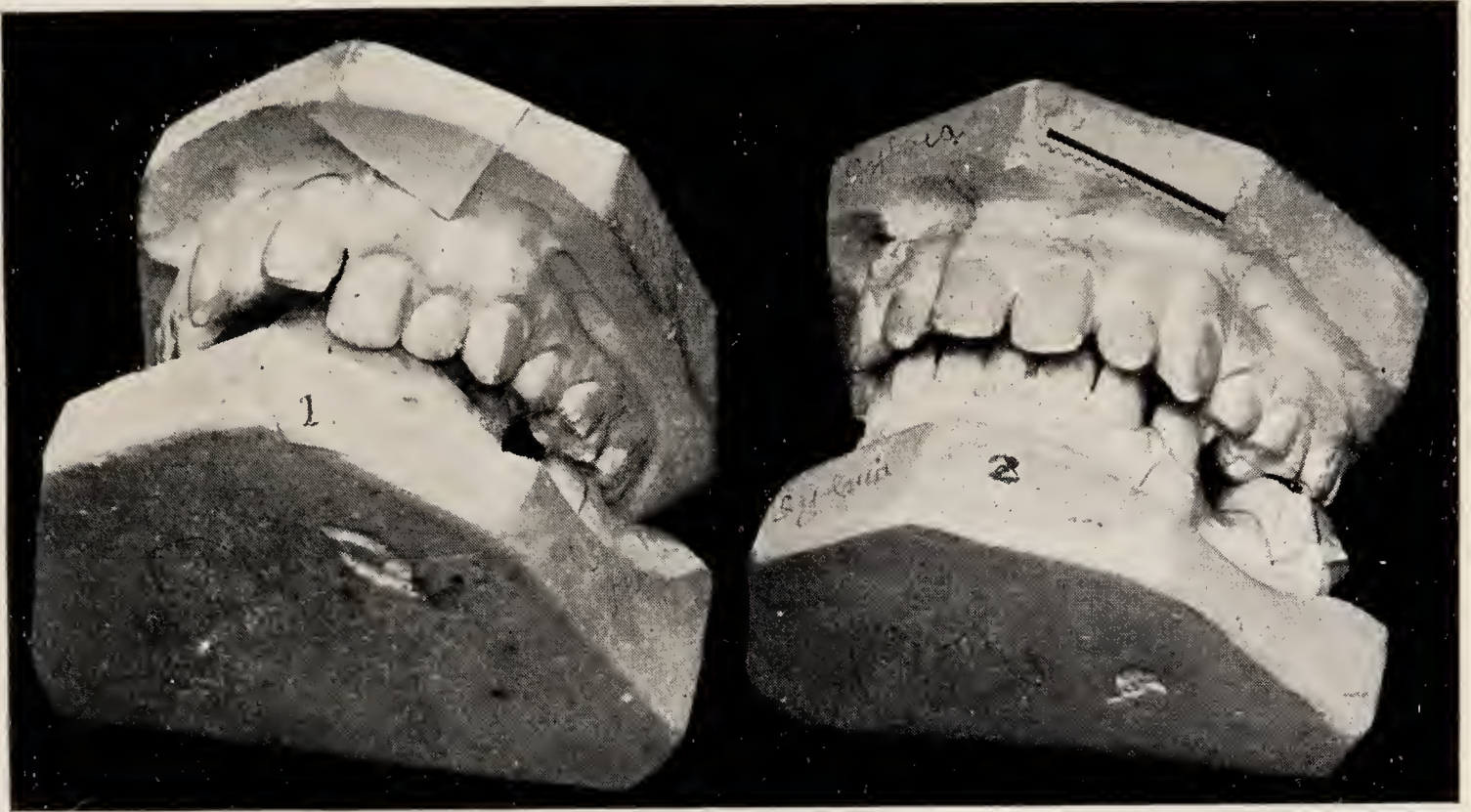
Mr. NORMAN BENNETT said that he was not quite familiar with the origin of the Committee, but he could say that the Committee itself did not think that it was doing anything so very revolutionary. It suggested no new terms, or almost none. It merely took terms which were in existence, which had been used for a long time, and compared them and tried to decide which was the better for the future. He did not think any terms were suggested with which members were unfamiliar.

Mr. NORTHCROFT advised members to look out for Mr. Sheldon Friel's paper when it appeared—he thought it was not yet in print—in the *International Journal of Orthodontia*, in which the Transactions of the Congress were being published. The Committee was under a deep debt of gratitude to Mr. Friel, who did a great deal of the spade work on its behalf, and his paper which he read in New York would be found to beautifully express the terms that the Committee brought forward; its language was very clear. He would appeal to the Editor of the *Transactions* to edit all papers with this report in view.

Mr. CARL SCHELLING recalled that when the Society started, its name was the Society for the Study of Orthodontia. Sir Herbert Warren of Oxford one day came into his (the speaker's) rooms and saw a notice relating to the Society and asked "What is Orthodontia?" He replied that the term was of trans-Atlantic origin, and asked whether it was objected to. His visitor said that it did not seem quite correct, that "orthodontic" might be better, and suggested that he write Dr. Sir James Murray, of dictionary fame, whose business and whose hobby it was to settle points of this description. He appealed to Sir James Murray for an authoritative ruling, and he suggested "orthodontics." The suggestion was brought before the Society's committee, where there was some objection, and indeed one member

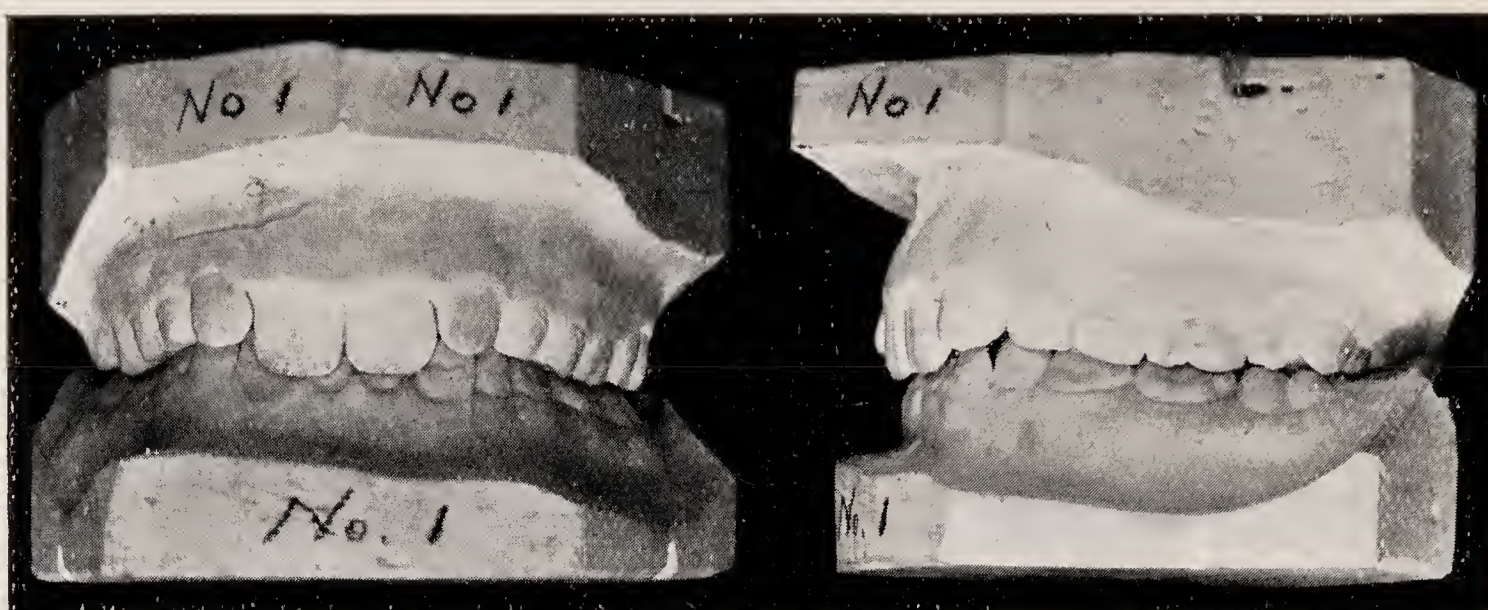


THE STORY OF A FAILURE.



Illustrating Mr. W. A. Bulleid's Communication.





Illustrating Mr. H. C. Highton's Communication.



brought weighty authority from the British Museum against the proposal, but eventually "orthodontics" was adopted. Sir James Murray said the word "orthodontology" was a very good one, for it expressed the condition of the teeth when reduced to a condition of "straighttoothedness." The speaker thought that some mistakes might easily creep in if the term "vestibular" was used instead of "buccal" or "labial," as suggested from America. But what was the matter with "outer" side of the teeth?

Mr. NORMAN BENNETT then proposed that the Report be adopted. Mr. CALE MATTHEWS seconded this proposal, which was carried unanimously.

Mr. CALE MATTHEWS asked whether the terms used in the report would be the official language of the British Society for the Study of Orthodontics.

The PRESIDENT: As far as possible.

Mr. CALE MATTHEWS: My sympathies are with the Editor.

A MEETING was held at 11, Chandos Street, on March 7th, 1927. Mr. H. C. HIGHTON, President, in the Chair.

### Casual Communications.

The PRESIDENT (Mr. Highton) said: I wish to bring forward this evening a short report of children of the same family, showing one case of malocclusion. There are three boys and one girl, the eldest being a boy  $9\frac{1}{2}$  years of age. The next two—boy and girl twins— $7\frac{1}{2}$  years of age, and the youngest a boy 4 years of age. They are all of average height and weight, except that perhaps the girl twin might be very slightly below the normal. The father and mother's health is good, and there was a normal birth in each case. All the children were breast fed for periods varying from six to eight months; they have had practically no sweets, plenty of fruit, and the mastication is fairly vigorous in all cases. Both the twins had adenoids and tonsils removed at the age of 3. The girl twin sucked her thumb from nine to eighteen months when the habit was definitely broken; the other children acquired no pernicious habits. The first models are those of the eldest child, which show normal occlusion. This is probably the type of case to which Hillman refers, when he states that one may get a range from edge to edge to a deep overbite which cannot rightly be termed abnormal. This boy has had one filling in the right lower second temporary molar. The youngest child, 4 years of age, is caries free, has an excellent record as regards health, his occlusion is normal, but I am sorry I am unable to show the models, peaceful persuasion having failed. The next models are those of the twin boy; he is also caries free and the occlusion is normal, but he at present shows an edge to edge bite in the incisor region. The last models are those of the twin girl, also caries free. These show definite post-normal occlusion, Angle's, Class II. The mother is quite definite with regard to the duration of the habit of thumb sucking, and apparently there was very little history of mouth breathing. This case struck me as being very interesting from the fact that it appears to show the comparatively simple manner under modern conditions in which malocclusion is brought about and the far-reaching effect of pernicious habits. Though to what degree either was responsible is difficult to say, except that we have here the comparison with the brother who also developed enlarged tonsils and adenoids, but not the habit of thumb sucking. It would appear that the latter had brought about the variation in the case of the girl.

The PRESIDENT announced that Mr. Evans was unfortunately unwell, and was unable to make his communication personally. He

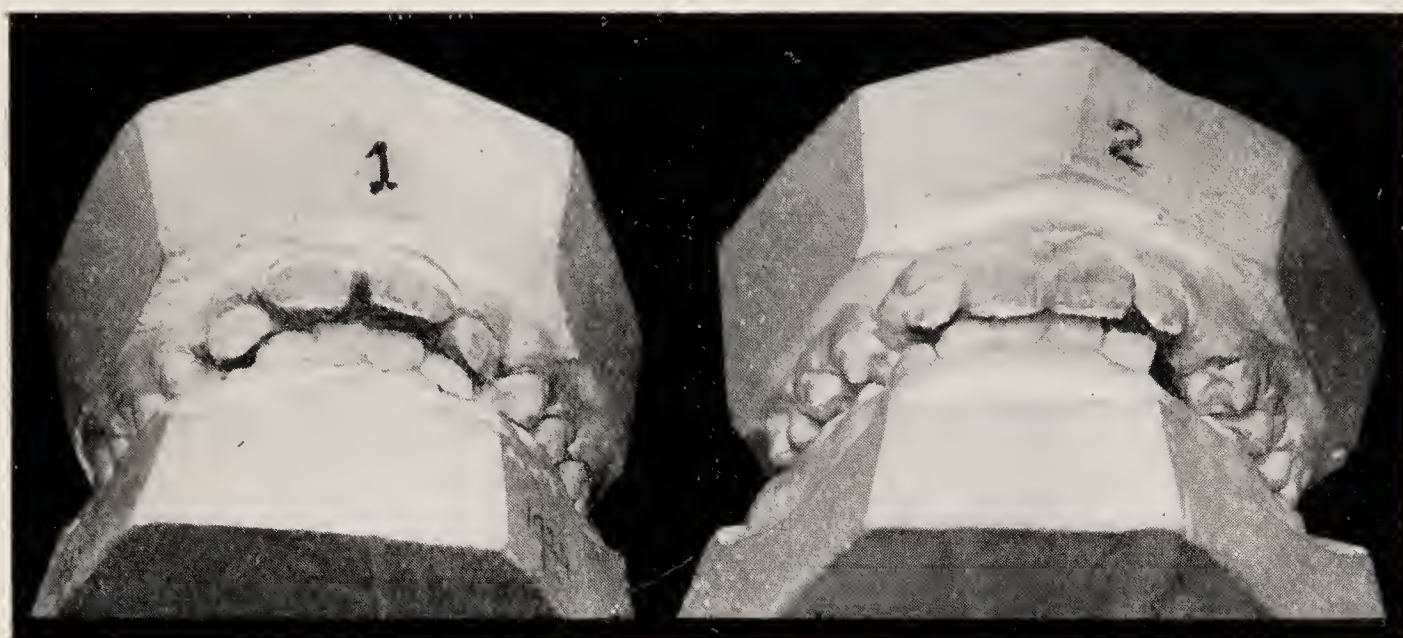


had, however, sent his models and notes to the Secretary, and he would therefore call upon Mr. Packham to read the communication as follows :—

The girl was a big, healthy girl of 12 years of age. She first attended the hospital under Mr. Dolamore at the age of 6½. The first models were taken when he first knew her. She was then a well-grown girl with excellent lips and a good round full face, and generally was in a perfectly healthy condition. The models shown on the screen were taken in 1924. There was considerable overlap of the upper incisors, as could be plainly seen from the models, and it would be seen that she had what was called a "flush occlusion," both on the right and on the left. She had a considerable amount of close bite, and the lower incisors were biting upon the cingula of the upper incisor teeth. It had fallen to his lot to decide what to do with the child. He thought she might be well described as a case of functional abnormal occlusion. She had a good bite, and could eat her food perfectly well. Her lips came together, and there was scarcely any, if a little, caries. It was a clean, functionally healthy mouth. As he had said, it happened to fall to his lot to decide what to do, and he decided to do nothing but to watch the child, and he particularly gave the mother instructions to attend at the hospital at once if she found any tendency for the lower lip to fall inside the upper incisor teeth. That was the advice, whether good or bad, that was given. Subsequently the child presented again, according to his memory in about six months' time, with a distinct tendency for the lower lip to fall inside the upper one in the manner which was so commonly seen nowadays, the tips of the upper incisors just falling upon the lower lip; treatment was decided upon straight away. A bite plate was put in capping the premolar teeth. The inclined plane was adjusted so that the lower incisors impinged upon it, and also a wire was brought from the caps round to the other side with a U which could be pinched and the wire tightened up either side. In addition to that, a Badcock screw was inserted in the plate, so that further expansion could be got if necessary. The child had worn a plate of that description; it had been re-made once or twice, and the models on the screen showed the girl as she was at present. The treatment had been remarkably successful. It had been very much more successful than the models showed. He could vouch for that, because he knew the child. What he thought had been done was that the molar occlusion had been changed to normal. The models themselves could be seen afterwards, and it would be noticed from them that the cusps interdigitated very well. The anterior buccal cusp of the first molar fell in the correct buccal fissure of the first lower molar, and the premolars interdigitated quite nicely. Mr. Packham thought that the case bore on the discussion of Mr. Bennett's paper (Transactions Report, 1926, page 139).

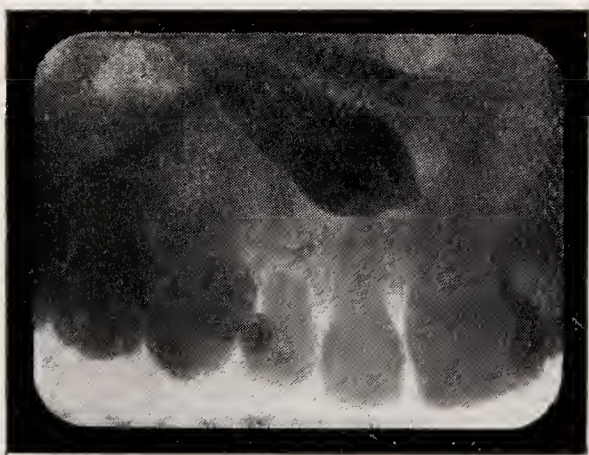
Mr. H. E. MARSH said he had brought forward the case he was about to describe because he thought it illustrated a common condition which occurred in the practices of most people. The first model showed the dentition of a girl, aged 10, of the petite type, in good health, of slender build and with small bones. He had made a careful inquiry into the child's history. She was breast fed. There was no sign, nor had there been, of nasal stenosis, no adenoids, and no disease of the tonsils. She had no signs of malformation of the scapula, which was sometimes seen in mouth-breathers. She was not a mouth-breather, nor was there any history of thumb sucking. The lower lip when first seen had just begun to form the habit of resting beneath the upper central incisors. There was a good deal of overbite. It would be seen how the lower incisors were biting in the palate. They were biting about three or four millimetres behind the upper central incisors. The occlusion at the sides was distinctly post-normal on the left and on the right. The models being opened showed that there





Illustrating Mr. H. E. Marsh's Communication.





Illustrating the Second Case in Mr. Cale-Matthew's Casual Communication.  
Radiographs taken from different angles.



was a great deal of lack of room in the canine region. There were remnants of roots of deciduous molars still present in the upper jaw. In the lower jaw the first deciduous molar on the left was touching the permanent lateral incisor. He did not know whether there was enough room for the tip of the permanent canine. He was wondering if that was a case where the occlusion had become post-normal as dental surgeons knew it, not on account of some pre-natal or immediate post-natal cause, but because of the loss of the deciduous upper molars, which had allowed the first upper permanent molars to travel forward, and that having taken place the lower incisors had over-erupted and had started the vicious thing that was happening. There was proclination of the upper incisors. He requested the Chairman to invite discussion on treatment in the case described, having regard to the small amount of room there was for the canines to erupt.

A Member asked what the profile was like.

Mr. MARSH replied that when the lips were closed one would say at once that the child was a Class I child, and the upper lip was not short. Showing a further model, he said it showed the stage arrived at after a year's treatment. He had attempted to treat the case without any extractions of permanent teeth, and had achieved what he thought was a great deal of expansion, but still did not obtain enough room for the canines to come down, and it appeared to him that he was getting a mouth out of all proportion to the size of the child, though he bore in mind that the child was growing. There was not much space between the premolars on the right side, and on the left there was a little more. If the models being shown were placed side by side with the original models it would be seen that a very great deal of extra width had been obtained in the maxilla and nearly as much in the mandible, but he had still thought he was not going to make a success of the case, and extracted the first premolars in both jaws; and he was not at all sorry that he had done so, nor was he sorry that he did so much expansion, because he thought if the extractions had been carried out without any expansion at all a much worse result would have been obtained. The overbite in that case was corrected with a fixed appliance. The child had been without appliances of any kind for a year, and there was no tendency for the upper incisors to tilt forward, as far as he could see. Mr. Marsh said the case brought out a point that he had noted in practice for some years. In Class I cases expansion in many cases was insufficient, and one did not get retention, and in cases of removal of either of the cheek teeth one got collapse of the bite. For that reason one found the upper incisors were bitten forward again; but he had found, and he thought other members had found also, that if one combined the extraction with expansion one got good results. Where one was in doubt of the eventual future of the case, if one commenced by expansion one could see how the treatment evolved, and it was always left open to the surgeon to secure the retention of the incisor teeth in a better position æsthetically by removing the premolars and drawing in the incisors, the combination of the two treatments being wisest.

Mr. HAROLD CHAPMAN said there was one point he had noticed in the second model Mr. Marsh had shown on the screen, but he had not noticed it in the first, that was that the upper first permanent molars appeared to him to be rotated, and that would probably account for some of the difficulties which Mr. Marsh had found in obtaining sufficient room for the canines. Rotation of molars with the medio-lingual cusp as the centre of rotation occurs frequently; the effect of such a movement is to bring the medio-buccal cusp more forward and inward than usual; such rotation gives the first molar an appearance of pre-normality, but such pre-normality only relates to a part of the tooth; it is important not to confuse the condition with post-normality of the lower molar. He did not see how those molars had rotated in Mr. Marsh's case, unless they had been held back by deciduous molar



roots and then subsequently moved forward and rotated at the same time. That would seem to be a rather unusual state of affairs to find, but then the case did seem to be unusual in other respects. He could not quite follow Mr. Marsh in his view that it was a Class I case. It seemed to him that the case was one of post-normality of the lower. The case was unusual, too, if, as Mr. Marsh suggested, those upper molars had moved forward and the premolars had also moved forward at the same time. He did not remember ever having seen a case in which he could feel sure that that had happened. It seemed to him that what took place was that the molar might move forward if it had nothing to hold it back, and if that happened one, usually the second, premolar erupted inside the arch; that was to say it was lingual to the general line of the teeth. However, he did think it was a very difficult case to diagnose, and one not only wanted to see the models, but the child as well. He had been going to suggest—he was speaking as if he had not seen the subsequent models which Mr. Marsh had shown—that the case might have been treated as if it were a Class II case in the orthodox way, and if one wished to reduce the treatment to a minimum one might have removed a lower incisor and two upper premolars, so leaving the lower arch much as it was, and the upper arch as it was, except to bring the upper premolars into line. Otherwise it could have been treated on orthodox lines, and it would not be necessary to remove the lower incisor.

Mr. MARSH said his idea was that it might have been that the temporary molars broke down in early life, and space was lost, and the upper maxillary molars travelled forward. Subsequently the upper premolars erupted and were induced forward by the position which the maxillary molars had assumed.

The PRESIDENT said: Mr. Marsh has brought forward a Communication which is very interesting from the fact that he has obtained an excellent result, without very extensive or complicated treatment, and one which also emphasises the importance of a very careful diagnosis before commencing treatment. It always seems to me that particularly in latter years, one has had the opportunity of considering the various factors which have been presented to the Society, in the diagnosis and treatment of our cases, and a little careful study of original models as the case presents itself will often solve many difficulties without the necessity of having to resort to complicated appliances. The canines in this particular case have fallen into correct alignment and the overbite has been considerably improved, also a functional occlusion has been obtained with, I have no doubt, a great improvement in appearance. The presentation of these cases is always valuable and instructive, being a departure from the usual routine of bands and arches and showing the advantage on certain occasions of judicious extraction. We often refer to the possibility of obtaining results by extraction in discussing the treatment of cases and it is of interest to record the result of treatment by this method. The difficulties of attempting to retain the full number of teeth and also the correction of the overbite are very evident in the case presented by Mr. Marsh, and I congratulate him upon his result.

Mr. PITTS said he thought Mr. Marsh might have taken out the first premolars straight away. He doubted whether anything had been gained by the preliminary expansion, because there was a considerable gap on the distal side of the canines, particularly in the lower jaw. When that was replaced by the premolar the gap would be considerable larger. A gap behind a canine was always a noticeable thing; it might get less, but from the models it looked as though it might have been better, in that case, to have extracted straight away, without any expansion.

Mr. MARSH, in reply, said he was very grateful to Mr. Chapman and Mr. Pitts for their remarks. To a large extent he agreed with both of them, although they had different ideas about the upper molars



rotating. They did rotate, and that was owing to lack of skill with the lingual arch. As to Mr. Pitts's point about extraction without expansion, that, of course, was a very tempting thing to do, but he had done it in a good many cases and found that the canines came down much nearer together than he wanted, i.e. the distance from the tip of the right canine to the left canine was not nearly as great as one would have liked, and he had felt in the present case that the stimulation of growth of bone obtained by mechanical expansion was beneficial. He agreed with Mr. Pitts, however, that there was too much room in the lower arch, and that there would be some spacing. He would try to keep an eye on the child and see what the condition was like when she was 16 or 17 years of age.

Mr. CALE MATTHEWS brought forward Casual Communications illustrated by X-ray photographs and models shown in the epidiascope. The first was a boy eight years of age, who presented in December last an erupted supernumerary canine lying behind the right upper centrals. The X-ray revealed another supernumerary tooth placed vertically with the apex downwards. A decision was made to extract the teeth, and the child was taken into a nursing home. He showed the two teeth extracted. There was a marked dissimilarity between them. They were extracted on December 23rd, the gum was freely dissected over the area and the bone was removed with a large cross-cut bur, fortunately without going too deeply; the tooth was removed without fracture. There was a considerable difference between the size of the crowns and also in the shape of these two teeth. He called them supernumerary canine-form teeth because they presented that appearance. A model taken a month afterwards showed the condition of the palate after the removal of the teeth. The second case was in a girl of twelve. (*See illustration, page 25*). Clinically there was no evidence of anything abnormal either in the vestibular region or the palatal area. X-ray stereoscopic pictures were taken, which revealed the left upper canine lying very nearly horizontal and a marked absorption or lack of completion of the apex of the left lateral tooth. He wanted advice from any member who had had a similar case. The teeth were of good quality. The child was a magnificent specimen of girlhood. He wanted to be quite sure whether the canine was labial or palatal. If labial he wanted to know that he was justified in endeavouring to draw it into correct alignment, and that the damage or lack of development of the lateral tooth would recover and justify that treatment. Otherwise it seemed to him that the tooth would have to be removed and ultimately the temporary canine would be lost, and following on general experience of such conditions, the lateral, owing to the lack of completion or absorption of the apex, would also be lost in a few years.

He showed radiographs of this case taken from different angles, taken by placing the film in the mouth, giving about half the normal exposure; then, without moving the film, moving the tube from 3 to 6 cm., resulting in a picture giving an idea of the relation of the different parts, also a complete palatal view. It was one of the most difficult decisions to make, whether to treat such a case from the orthodontic point of view or to use the forceps at this stage.

Mr. S. F. ST. J. STEADMAN said, with regard to the second case, that he had seen, he thought, two or three such cases. His experience was that these teeth were nearly always on the palatal aspect. He had seen one or two temporary canines in a patient very much older—twenty—and he could not see why that tooth should be lost as early as Mr. Cale Matthews seemed to think. He would be inclined to remove the canine and leave the other. He also pointed out that the apex in these teeth was often bent almost at right angles, and therefore the teeth could not be removed any distance. He had had one in which the apex was bent actually at a right angle, and he did not think any movement was possible there.



Mr. H. E. MARSH (Bexhill) mentioned a case which he had treated, as had another member who was present, many years ago. The canine there did exert great pressure on the lateral incisor, which became loose and inflamed and died and had to be extracted. Since that time he had never had such a case as that with which Mr. Cale Matthews was confronted, but if so he thought he would make an exploratory operation under local anæsthesia, and try to find out exactly the relation in which the canine tooth lay to the other teeth, and having that in view, having removed at least enough bone to find out where the crown was, he would decide whether mechanical means of removing that tooth could be usefully employed or whether it was better left where it was, the flap sewn up, and the lateral given a chance to remain alive and firm.

Mr. NORMAN BENNETT said that the second case reminded him of a somewhat similar case—a girl of about fifteen years of age—in his experience. There the canine was misplaced, the temporary canine was gone, and the space was to some extent closed up between the lateral and the premolar. There was no question of absorption of the lateral, but he had to decide whether it was possible to get the canine down. The gap was unsightly, and he cut down upon the canine, removed a certain amount of bone, and was pleased to find that after leaving it alone a little while it did erupt sufficiently for him to be able to get to work upon it and bring it into position. The case was never quite completed, because the lateral was rotated and overlapped the central a little. In Mr. Cale Matthews's case he would very much doubt whether treatment of that kind would be successful, because it seemed to him that the canine was more misplaced than in his own case. He would be inclined to remove it and leave the deciduous canine there.

Mr. A. L. PACKHAM thought that Mr. Cale Matthews might have some difficulty in persuading the parents to allow the extraction of the lateral. It might be suggested to them that the tooth should be tested for thermal changes once a month for six months, and as the tooth would undoubtedly die in due course it could be demonstrated to the parents that extraction was advisable.

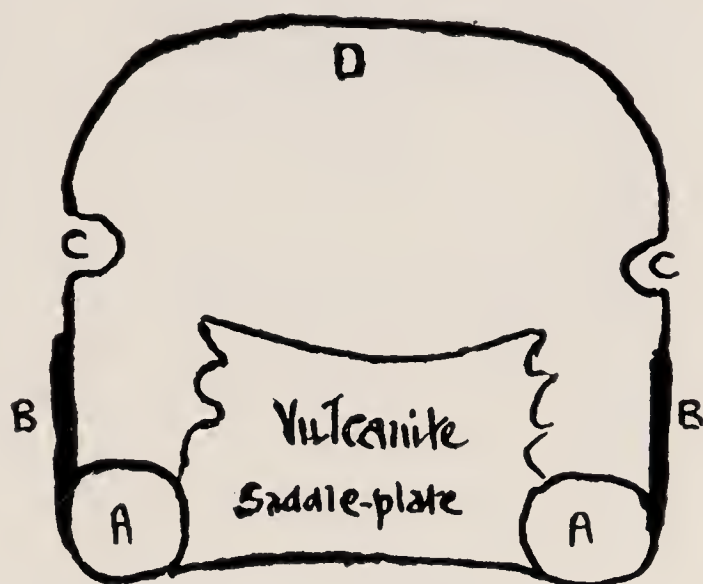
Mr. NORTHCROFT said that one never knew when the tooth might die and a septic abscess form. It was necessary to keep it all clean and healthy. It would be a great mistake to let the pulp of that tooth die and possibly suppurate.

Mr. NORMAN BENNETT did not see any reason why it should die at all. There was nothing to make it die. The temporary canine might remain in position for many years.

Mr. CALE MATTHEWS said that he was deeply grateful to the members who had spoken. This child might not come under his hands for treatment at all. She was sent to him in consultation by a very able operator who did not practise orthodontics, and he gave him advice which he thought practically coincided with the opinion conservatively expressed by those speakers who would endeavour to retain | 2 3. That an exploratory operation should first of all be undertaken to see exactly where the canine lay. But the time would ultimately arrive when the temporary canine was lost, and when a damaged lateral such as this might be also lost. Then the difficulty, later in life, of having to draw the canine into position, or, if removed at this stage, of having a space of two teeth. There was no impossibility about drawing teeth into position if the operator was equal to the occasion. If that lateral had to be removed and the canine was drawn into position, it would be possible to fill the lateral gap with a Carmichael crown carrying the lateral facing, and the ultimate æsthetic appearance of the child would be very good. The loss of the lateral was serious to a girl, and the loss of a canine, in view of its function, was also serious. That was the advice he gave, and he thought it very much assimilated the idea of the members who had spoken. He was grateful for what they had said, and the little discussion illustrated again the great value attaching to the meetings of the Society.



Mr. L. F. FOURAKER described "A Case in Practice." A girl patient aged 14 was referred to me for orthodontic treatment. Clinical examination showed that the case was Angle's Class II. Models were taken, and after consultation with the parents it was decided to remove the two upper first bicusps and retract the six upper front teeth.



- (A) Two cribs fitted around 6|6
- (B) Heavy G. silver wire soldered to cribs.
- (C) Loops which are closed at frequent intervals, thus acting on front teeth and retracting them.
- (D) Gauge 19½ platinised gold wire soldered to the G. silver wire.

A plate was made as per diagram, and in three months the upper teeth were considerably improved. I would particularly like to point out, however, that the two first upper molars have also moved considerably. This is a point of great interest, which is very often overlooked.



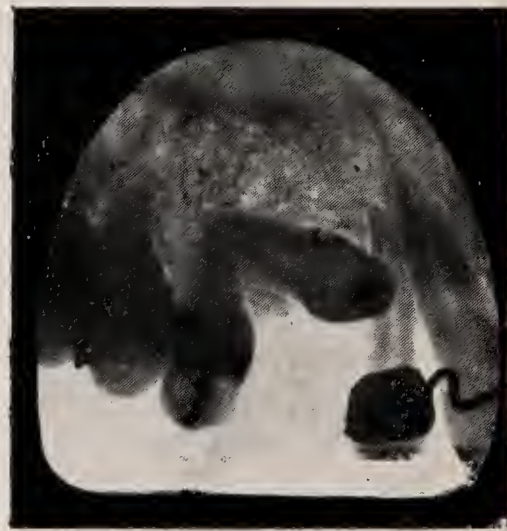




FIG. 1. CASE I.  
X-ray of original condition.



Left upper canine.



Right upper canine.

FIG. 2. CASE II.  
X-rays of original condition.



FIG. 4. CASE III.  
X-ray of original condition.

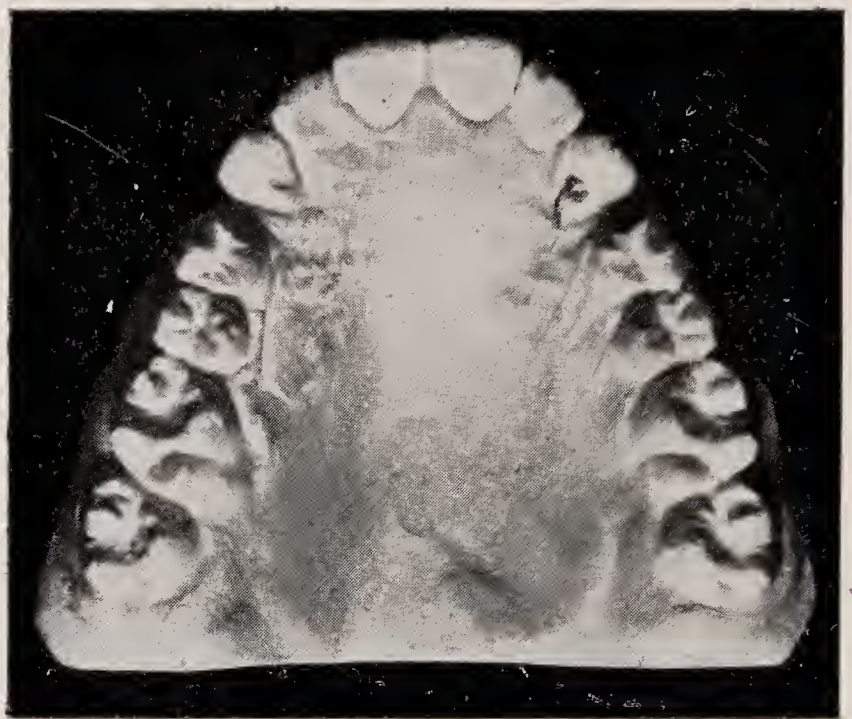


FIG. 3. CASE II.  
Model showing canines brought into position.

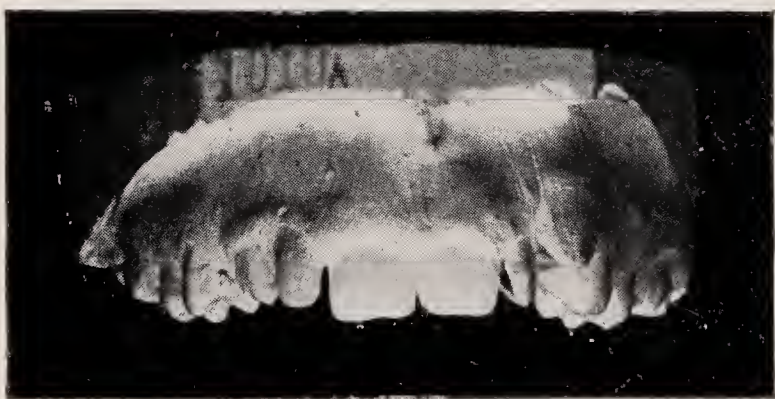


FIG. 4A. CASE III.  
Showing canines in position; the left not completely brought down yet.

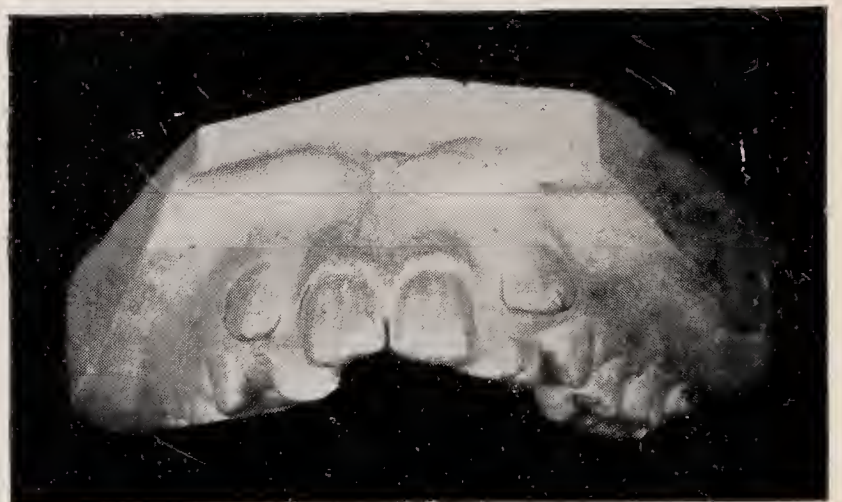


FIG. 5. CASE IV.  
Model showing original condition.

Illustrating MR. HAROLD CHAPMAN'S COMMUNICATION.



## DEMONSTRATION MEETING, MAY 9TH, 1927.

Miss K. C. SMYTH demonstrated Mr. N. G. Bennett's Prosopometer. This instrument is used chiefly to obtain antero-posterior measurements, but vertical ones can also be calculated from the chart upon which the records are made. The frame of the instrument is an arch of metal, which rotates around a line joining the external auditory meatuses. Ear-plugs, arranged on springs, fit into the meatuses, and the bars which carry the plugs represent the axis around which the metal arch rotates. There is a kind of tripod which rests on the head, with three adjustable rubber cushions, the whole being attached to a rod which passes through a sleeve in the summit of the arch of the framework, so that when the arch is in the upright position the rod and its tripod attachment are vertical. The amount of pressure transferred to the head through the tripod is determined by a pressure gauge in the rod, and when two given lines are made to coincide the exact weight of the whole instrument is transferred on to the head, thus obviating any straining or pulling of the meatuses. When the instrument is so adjusted and fixed in position with a set-screw it is quite steady and does not need holding.

From the same points of attachment as the ends of the arch project two parallel rods, also describing an arc around the line joining the meatuses. Upon these rods slide a pair of sleeves joined by a cross-bar, across the centre of which is another pressure gauge. Into a little slot at the inner end of this gauge fit the vulcanite pieces (interchangeable) with which the measurements are actually taken. The sleeves carry cross-bar and vulcanite piece to the desired point on the face, the gauge regulating the amount of hand pressure used, and thereby ensuring a constant degree of compression of the soft parts, while set-screws fix the sleeves on to the rods in the required position.

The records are made on a chart attached to a flat plate fixed to one side of the arch of the framework in a sagittal plane. Once the ear-plugs and headpieces are fixed in position this plate also becomes fixed. A flat metal pointer is attached to one of the sleeves referred to above, parallel to it, and moves with the sleeve and cross-bar, passing over the surface of the chart. The apex of a V-shaped notch in the end of the pointer exactly corresponds to the point of the vulcanite piece with which measurements are taken, and a pencil mark is made. The chart is graduated in millimetres, the line joining the ear-plugs being zero.

Mr. HAROLD CHAPMAN showed three cases of impacted canines and one case in which the canines were situated unusually far forward, so as to lie almost entirely over the laterals.

*Case I.*—The first case involved the left upper canine in a girl aged 15½ (Fig. 1). The space had been retained for several years, but the tooth did not erupt. It was decided to expose the crown of the tooth and to pull it down. In April, 1926, the tissues overlying the crown were removed by local anæsthesia, a small pit drilled in the crown of the tooth and a gold post cemented in. The necessary attachments (molar bands with vertical tubes) for a lingual arch were inserted previous to this operation, and as soon as the tissues had settled down the prepared arch was put in, with an auxiliary spring caught above the spur in the canine so as to exert pressure on it downwards and outwards. In January, 1927, the tooth was in excellent position.

*Case II.*—The next case showed the two upper canines lying semi-horizontally, with their crowns high up in the palate (Fig. 2). Their positions were correspondingly identical on the two sides. They were



treated in the same way as those in the previous case; their ultimate position (Fig. 3) was not quite so pleasing on account of their slight rotation. The fact that they were lying more horizontal did not present any greater difficulties.

*Case III.*—The third case was one in which the right upper canine was placed similarly to that in the two cases just reported, but the left one was situated buccally (Fig. 4) and over the lateral, which was much rotated, otherwise the direction of the tooth was similar to its fellow on the other side and to the canines in the previous case. The buccally placed canine was pulled into position by means of rubber bands attached to a hook cemented in the crown of the tooth and to the back of a labial arch attached to the first upper molar. To ensure that this upper molar should not be displaced, intermaxillary traction was worn from the labial arch in the upper canine region to the lower molar region, a lower lingual arch being in position. This canine had caused absorption of the apex of the lateral, which at one time was loose and it was thought would be lost; since the canine has been moved distally the lateral has been much firmer. Fig. 4A shows the condition as it is now; the movement of the canines is not complete.

*Case IV.*—The fourth case was one in which the upper canines had erupted far forward, so as to lie over the laterals (Fig. 5). The canines were banded and to each band (Fig. 6A) a vertical extension upwards was soldered; to this a rubber band was attached, the other attachment for it being the buccal tube on the molar band carrying an arch. Towards the incisal edge of the band a loop (Fig. 6A) was soldered and to this an auxiliary spring from the buccal arch was attached. By this means a greater force was exerted on the apex of the tooth than on the crown; the later model shows that the tooth had moved backwards bodily. It should be added, however, that intermaxillary traction was used in this case, as in the previous one, to prevent displacement forward of the premolars and molars (the first premolars had been extracted). However, these (first molar and second premolars) teeth have moved forward and the case was shown to emphasise the necessity of great care in the conservation of this anchorage and that the lower teeth should be used to move the upper canines; an upper lingual arch in contact with the lateral would have assisted to stabilise the upper molar anchorage. Possibly a horseshoe spring, attached to the upper buccal arch and engaging a half-round tube on

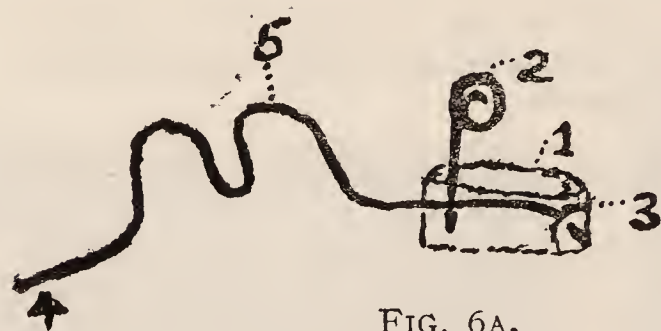


FIG. 6A.

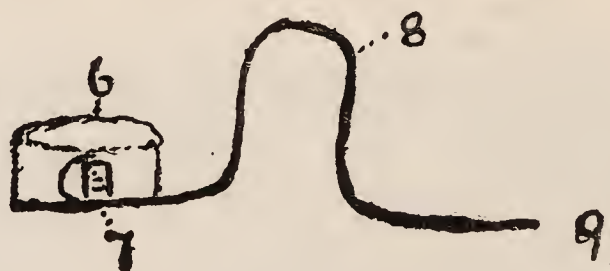


FIG. 6B.

- FIG. 6A. (1) Right canine band.  
 (2) Spur extension apically for attachment of rubber band.  
 (3) Loop attachment for auxiliary spring 5.  
 (4) Buccal arch.  
 (5) Auxiliary spring.
- FIG. 6B. (6) Left canine band.  
 (7) Half-round tube attached vertically.  
 (8) Horseshoe auxiliary spring attached to buccal arch;  
       free end carries half-round rod to engage tube on band.  
 (9) Buccal arch.



a band (Fig. 6B) on the canine would have served equally well to move back the upper canines bodily; such an arrangement would have been simpler and possibly as effective as that employed.

Mr. C. S. MORRIS demonstrated:—

(1) Orthodontic bands fitted to the teeth by splitting the corners and folding the edges over. Subsequently solder was flowed over this portion of the band. This prevented peeling off by force of mastication.

(2) Murrless's Latch for fixing the Mershon Arch. This consists in having a spring running towards the front part of the tube fitting into a slot which cuts into both tube and tongue, so that when the tongue is pushed into place the spring slips down outside the tube, engaging in the slot, effectually locking it down. The purpose of this latch is to prevent any necessity of interference with the gum by the spring going down between the end of the tube and the gum.

(3) A latch for vulcanite plates was also shown. This consisted in having orthodontic bands fitted to molars with spurs running forward anteriorly to the posterior surface of the tooth in front. A spring attachment is fixed to the plate with a spur on it on one side, and a single spur on the other. The single spur is first of all introduced underneath the spur on the band and the plate pushed up into position, the spring being drawn back on the other side and allowed to engage underneath the spur on the band on that side. The plate is thus effectually locked to the teeth. To take out the plate all that is necessary is to pull in the spring so disengaging the spur, so that the plate can be easily pulled out from the opposite side.

Mr. NORMAN GRAY—"Impression Taking." In this technique the plaster is silted into tepid water until it begins to show above the surface. The top fluid is then poured off and the plaster is ready for use. The plaster I have been using is Clover Leaf XX rapid-setting impression plaster. It is advisable to add a small pinch of salt to the water.

To take an upper impression. With a small spatula a little of the plaster is put under the lip high up in the sulcus of the incisor and molar region and palate. The tray is lightly filled with plaster and pressed home. The trays I use are S. S. White Lower Nos. 149, 147, 145, 143, Upper Nos. 140, 136, 134, 132; these provide a suitable selection for almost all orthodontic cases. These trays are never allowed to go into the workroom and so can be kept brightly polished. During the setting period I talk to the small patient to keep the mind away from the thought of plaster, at the same time removing the surplus from the edges of the tray with bibulous paper. As soon as the plaster is set, steady pressure on the handle removes the tray from the mouth, leaving the plaster *in situ*. With a thin-bladed plaster knife a longitudinal slit is made over both canine eminences from the mucous fold to the tips of the teeth. The blade of the knife is prised into this crack and then the anterior section covering the six incisors is readily withdrawn. Similarly the impression from the buccal surfaces of the molars and gums will be easily dislodged by pressure in backward and downward direction. The remaining palatal portion can usually be removed *en bloc* by firm down pressure.

The tray is washed immediately after use, polished and returned to the cabinet. The segments of the impression are washed in cold running water and then allowed to dry. These pieces are then waxed together without the tray and then the impression is boxed in with plaster. This is most important if stone is to be used. Two coats of shellac and one of varnish are given when the plaster is dry. The teeth and palatal portions should be packed with Healey's White Artificial Stone. This is mixed into an extremely stiff mass and packed like vulcanising rubber, then allowed to set for six hours. The remainder of the model must be poured in ordinary plaster, as the stone is too hard to trim. If the models are made of stone, the stripping



of the impression is a very simple matter. The material is scraped away in grooves until the shellac shows, and then the sections are chipped off carefully.

Mr. H. C. VISICK had for his subjects the following:—

“The Retention of Orthodontic Plates.” The main idea is to obtain a grip of the lingual side of the molars or premolars, as well as on the outside, with a crib. This end is obtained by scraping a little groove on the lingual side of the teeth to be cribbed. Take 1 in. of 16-ct. gold wire, gauge , form it into a pot-hook, flatten the short end and turn it away from the long end so that it will fit into the groove at the neck of the tooth. It should be done well below the free margin of the gum, but of course must stop short of the peridental membrane. I usually put one on the molar and one on the first premolar, and oppose these with what I call a  $\frac{3}{4}$  crib, that is, instead of having a crib a continuous loop right round the tooth, I only take it down one side and along the buccal surface. The free end of this crib is filed to a knife edge, and one can adjust it up or down to grip the tooth at the most advantageous point. When inserting the plate, the lingual spur can be adjusted with a pair of pliers, so that the plate will go in with a snap and remain rigidly in place. If it is found that this spur is too long, it can easily be ground down with a carborundum stone.

“Bite Raising Plate.” In cases where the bite is too close and the lower incisors impinge on the upper gum, it would seem foolish to attempt to raise the bite by blocking open the mouth in the molar region. This simply leads to a worse condition. To improve the condition, one has to block the bite in the incisor region. The usual way is to put in an upper plate with a block on which the lower incisors bite. There are two disadvantages to this: one is that the gum has to take all the pressure and often becomes very inflamed, another is if a thick block of vulcanite is put the patients do not use it, and if a thin block is used frequent additions have to be made. In the plate shown, the platform on which the lower incisors impinge is as thin as possible, allowing the molars almost to come in contact. Four spurs of thick half-round wire are embedded in this platform and bent in such a way that they rest on the edges of the four upper incisors. Every few weeks the patient is seen, and if the molars have come together these four spurs are bent so that the pressure is taken on the incisors and the platform raised a fraction of an inch away from the gum. It is necessary to have labial arms soldered to the molar cribs to prevent the incisors being pressed forward. At the end of six or nine months it will be found that this plate, without any alteration beyond the bending of the wires, has produced a space between the lower incisors and the upper gum of anything up to  $\frac{1}{8}$  in.

AN ordinary meeting of the Society was held at 11, Chandos Street, Cavendish Square, W.1, on Monday, October 3rd, 1927, Mr. H. C. HIGHTON, President, in the chair.

The Hon. SECRETARY read the minutes of the last meeting, which were confirmed.

Mr. J. H. BADCOCK asked if he would be in order in suggesting that an acknowledgment of the courtesy of the European Orthodontological Society in asking the Society to attend their Congress last July should be sent to the European Society.

The PRESIDENT said he would be very pleased to give instructions that such an acknowledgment should be forwarded.

The following candidates were unanimously elected by a show of hands:—

*Corresponding Membership.*—JOSEPH THOMAS SEWARD, L.D.S. (Aust. College of Dentistry), B.D.Sc. (Melbourne), 55, Collins Street, Melbourne; and EDMOND CHARLES GATES, D.D.S. (Chicago), Wyoming, 175, Macquarie Street, Sydney.

Mr. SHELDON FRIEL read the following paper:—



## FURTHER INVESTIGATIONS CONCERNING MUSCLES AND THEIR RELATION TO THE GROWTH OF THE JAWS.

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By SHELDON FRIEL, B.A., M.Dent.Sc.

I MUST apologise for the incompleteness of this investigation, but it has proved to be a far greater time consumer than was originally estimated.

During the last six years I have been examining small schools of boys annually, testing their muscle strengths, weights and heights and in the last year taking certain head measurements as well as models. These models of the same children at different age periods and of children of the same age period had been the foundation of my paper at the International Orthodontic Congress in New York last year on "The Changes in Occlusion from Infancy to Old Age." I demonstrated in that paper that the lower deciduous teeth moved forward a greater distance than the upper deciduous teeth in the period from 3 to 6 years of age. This conclusion was confirmed by Professor Brash in his paper on "The Growth of the Alveolar Bone and its Relation to the Movements of the Teeth, including Eruption." This forward movement necessitated an edge to edge bite of the deciduous incisors and was associated with considerable wear. The curve of von Spee became flatter. Diagrams 1, 2, 3, 4. Where the forward movement had not taken place I noticed frequently that the teeth were not worn and that an excessive overbite of the permanent incisors was present (Fig. 1).

In order to prove whether close bite had this relation to want of forward development of the lower arch and want of function, it would be necessary to examine a large number of children. So many tests and measurements being taken in the examination of these previous school children makes it impossible to get through a large number of children. On this account Mr. McKeag of Belfast and I decided if possible to get hold of a large school and to limit the examination to height, weight, jaw pressure, certain head measurements and models, to see if we could determine what were the immediate causes of close bite and secondly whether jaw pressure was related to it.

Last May we measured some twenty-four skulls in the R.C.S. Eng. Museum and in the Anatomical Department of Birmingham University to see if they would give any indications as to the nature of normal bite.

Early in the summer I got in touch with an industrial school outside Dublin, containing 760 boys from 7 to 16 years of age. Mr. McKeag and I gave up the last four days of our holidays to examine them. The first day we went through the whole 760 boys and selected those with functional normal occlusion and those with close bite. We selected altogether 270 boys. The next three days we attempted to test and measure these boys. We only succeeded in examining 162, and we shall not be able to conclude the examination until some time later.

The time since the examination at the end of August till now was far too short to work out the material satisfactorily. The making of 162 pairs of models alone is quite an undertaking. For these reasons this report must be taken as being of a preliminary



nature, and the conclusions drawn are put forward very tentatively.

TABLE I.  
AVERAGES OF SKULL MEASUREMENTS WITH PERCENTAGES OF NORMAL  
(Boys).

	Nasion-Sub-mental.	Nasion-Incisor.	Nasion-Molar.	Lower Incisor Sub-mental.	Lower Molar—Lr. Bord. Mandible.	No. of Cases.
Saxon skulls (adults) .. Birmingham.	11.5cm.	7.7cm.	8.1cm.	4.0cm.	3.9cm.	12
British skulls (adults) .. R.C.S.Eng.	10.4cm.	6.9cm.	7.2cm.	3.8cm.	3.4cm.	7
British skulls (children) R.C.S.Eng.	9.6cm.	6.6cm.	6.8cm.	2.8cm.	3.2cm.	3
Mr. Campion's averages at 9-11.	10.0cm.	6.4cm.		3.6cm.		10
Mr. Campion's averages at 15-16.	11.1cm.	7.3cm.		4.1cm.		9
Mr. Campion's averages at adult.	12.3cm.	7.7cm.		4.5cm.		10
Industrial school boys (norms.).	10.5cm.	6.9cm.	7.6cm.	2.9cm.	2.3cm.	144
Saxon skulls, percentage of boys (norms.).	109%	109%	108%	128%	141%	
British skulls (adults), R.C.S.Eng., percentage of boys (norms.).	99%	100%	92%	124%	132%	
British skulls (children), R.C.S.Eng., percentage of boys (norms.).	91%	95%	83%	96%	128%	

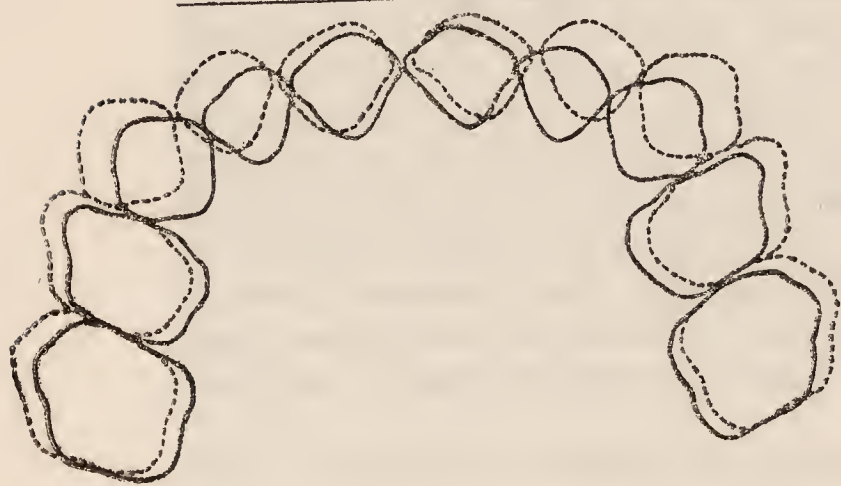


DIAGRAM 1.

DIAGRAM 1.—Showing the changes in the deciduous teeth from three to six years of age. Note that as well as the lateral expansion both upper and lower arches have moved forwards, especially the lower arch.

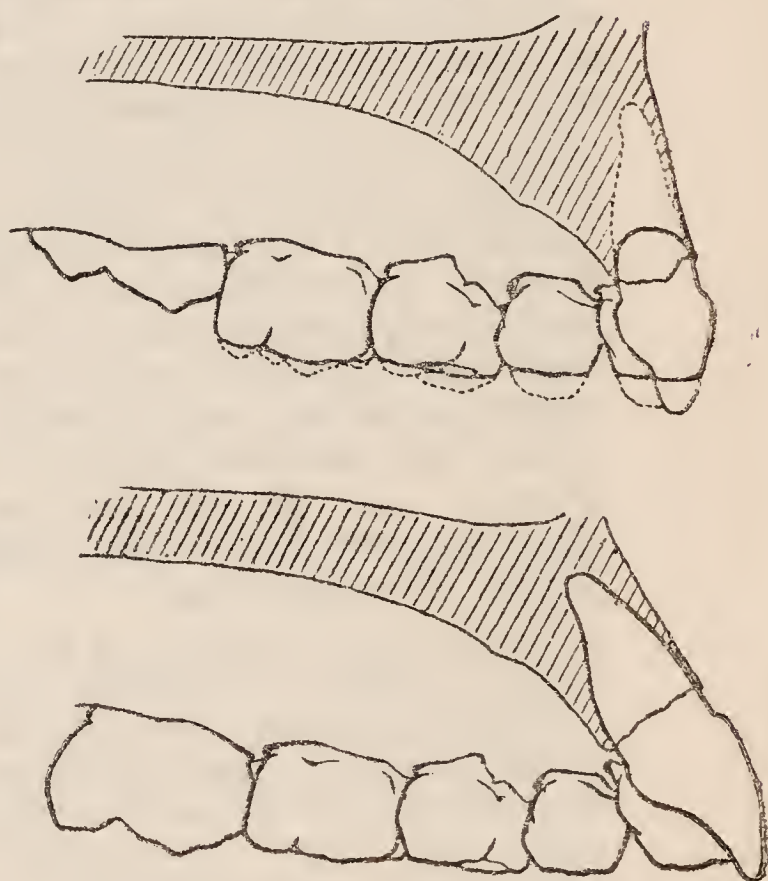


DIAGRAM 2.

DIAGRAM 2.—Showing the different inclination of the deciduous and permanent incisors. The incisal edges of the upper permanent incisors occupy a larger arch of a circle than that of their predecessors.



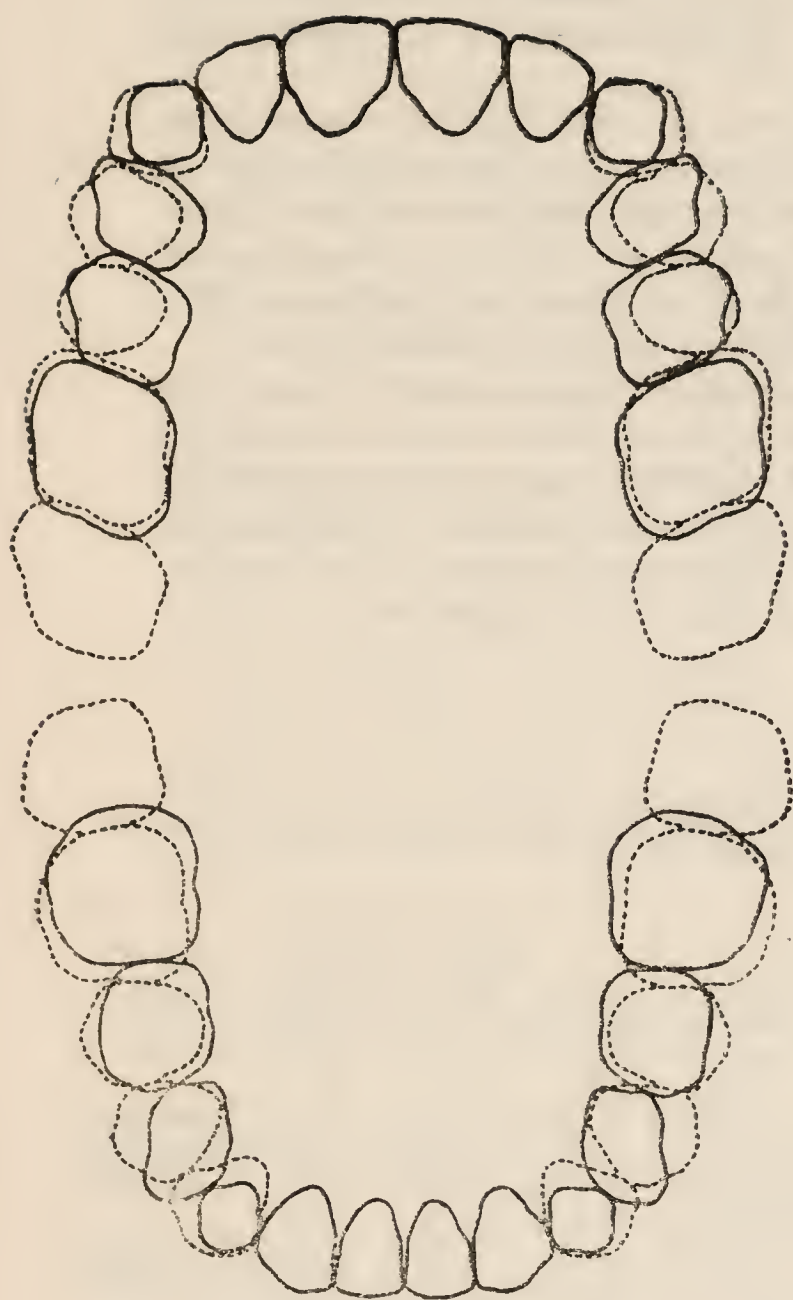


DIAGRAM. 3

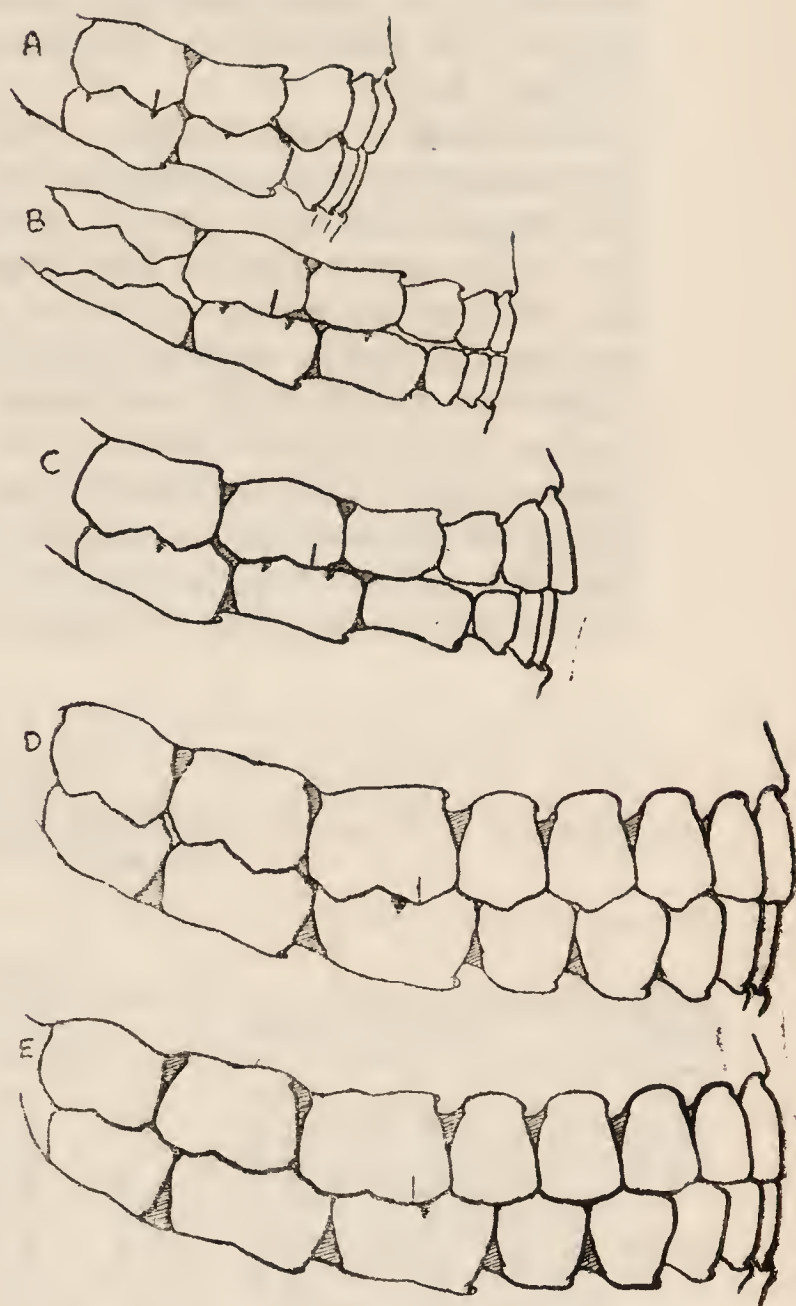


DIAGRAM 4.

DIAGRAM 3.—Showing changes following the loss of the deciduous molars and canines. Note that spaces are completely closed in the lower arch, but spacing is present in the region of the canine in the upper arch.

DIAGRAM 4.—Stages of occlusion from three years of age to old age. (a) At three years of age the triangular ridge of the medio-buccal cusp of upper second deciduous molar occludes in the buccal groove of the lower second deciduous molar. (b) At five and a half years of age lower arch has moved forwards, so that the buccal groove of the lower second deciduous molar is medial to the triangular ridge of the upper second deciduous molar. (c) At eight years of age the lower arch has moved slightly more forwards in relation to the upper arch; the permanent incisors and first permanent molars have erupted. (d) Young adult. The point of the cusp of the upper first permanent molar is medial to the buccal groove of the lower first permanent molar. No contact between the disto-buccal cusp of upper first molar and medio-buccal cusp of lower second molar. (e) Old age. Teeth worn. Lower teeth in more forward relation to upper teeth. Buccal groove of lower first permanent molar is medial to medio-buccal cusp point of upper first permanent molar. Disto-buccal cusp of upper first permanent molar is in contact with medio-buccal cusp of lower second molar. Incisors meet edge to edge.



The measurements and pressures are grouped in relation to the boys' sitting height. Each group comprises boys varying in height between 2 cm. It is hoped in the final paper to also group them according to their dentitions, as has been done by Hellman in his paper "A Preliminary Study in Development as it Affects the Human Face."

The head measurements carried out by Mr. McKeag were from the nasion to the submental point, nasion to the incisal edge of the upper incisors, nasion to the occlusal surface of the upper first permanent molar, the incisal edges of the lower incisors to the submental point, and the occlusal surface of the lower first permanent molar to the lower border of the mandible in cm.

It was not thought advisable to take measurements from the nasion to the upper incisal gum margin or from the lower incisal gum margin to the submental point, partly on account of gingivitis and gum hypertrophy, and partly because it would be impossible to take similar measurements in the molar region. The instruments used were those designed by Mr. G. G. Campion.

TABLE II.

AVERAGES OF 144 NORMAL AND 109 EXCESSIVE OVERBITE CASES, WITH PERCENTAGES OF NORMAL IN OVERBITE CASES.

Sitting Height.	Weight.	Right Molar.	Left Molar.	Incisor.	Nasion Sub-mental.	Nasion Incisor.	Nasion Molar.	Lower Incisors Sub-mental.	Lower Molar—Lr. bord. Mandbl.	No. of Cases. Type.
cm.	kg.	kg.	kg.	kg.	cm.	cm.	cm.	cm.	cm.	
61-63	28.7	25.6	24.6	7.5	9.58	6.34	6.58	3.05	2.5	3 Normal
64-65	26.64	32.2	31.2	12.0	9.76	6.47	6.93	2.72	2.13	11 Normal
	24.8	20.6	22.5	6.0	9.76	6.52	6.74	3.39	1.96	4 Excessive
	93.5 %	64 %	72.1 %	50 %	100 %	100.7 %	96.1 %	87 %	92 %	
66-67	29.9	36.13	36.7	12.2	9.97	6.55	7.03	3.07	2.44	12 Normal
	30.15	30.7	31.2	11.9	10.09	6.83	7.18	2.69	1.94	11 Excessive
	100.8 %	84 %	85. %	97 %	101.2 %	104 %	103 %	87 %	79.5 %	
68-69	31.5	33.3	33.05	11.09	10.13	6.71	7.18	2.77	2.20	22 Normal
	30.9	33.1	34.6	10.5	10.05	6.71	7.20	2.57	1.97	16 Excessive
	98.1 %	100 %	104.6 %	94 %	99.2 %	100 %	100.4 %	92 %	89.5 %	
70-71	34.17	42.72	43.31	16.51	10.39	6.81	7.23	3.05	2.46	30 Normal
	34.12	41.7	42.54	18.5	10.27	6.89	7.21	2.75	2.14	26 Excessive
	99.8 %	97 %	98.2 %	112 %	98.8 %	101 %	99.6 %	90 %	87.0 %	
72-73	37.08	39.9	41.52	14.28	10.55	7.06	7.45	2.77	2.17	21 Normal
	35.24	38.11	41.94	16.40	10.30	6.95	7.29	2.73	2.13	25 Excessive
	95 %	95 %	101 %	128 %	97.7 %	98 %	97 %	98 %	100 %	
74-75	38.8	46.7	46.7	17.2	10.52	6.91	7.41	3.02	2.37	20 Normal
	38.7	40.5	38.6	14.7	10.66	7.04	7.57	3.10	2.37	15 Excessive
	100 %	86 %	82.6 %	85 %	101.3 %	101 %	103 %	102 %	100 %	
76-77	45.37	48.57	49.57	22.05	11.04	7.36	7.85	2.89	2.10	9 Normal
	42.2	38.0	41.3	10.2	10.83	7.33	7.60	2.47	1.78	4 Excessive
	93 %	78 %	83.3 %	46 %	98.9	99 %	95.7 %	85 %	84.8 %	
78-79	50.33	43.6	41.3	15.3	11.37	7.31	7.83	2.73	2.17	3 Normal
	43.97	48.0	44.3	21.12	10.89	7.3	7.68	3.20	2.21	4 Excessive
	87.3 %	110 %	107.2 %	138 %	95.8 %	99 %	97.4 %	117 %	101.4 %	
80-81	50.4	48.8	42.6	16.3	11.42	7.41	7.75	2.70	2.01	5 Normal
	48.9	43.0	42.0	12.3	11.35	7.65	7.95	2.71	1.97	3 Excessive
	97 %	89 %	98.6 %	75 %	99.3 %	103 %	96.6 %	100 %	98 %	
82-83	52.26	48.0	48.6	15.16	11.43	7.54	7.93	2.68	2.15	3 Normal
	50.80	57.0	53.0	31.5	11.35	7.72	7.84	2.74	2.19	1 Excessive
	97.2 %	118 %	109 %	207 %	100.7 %	102 %	98.4 %	102 %	101.4 %	
84-85	50.7	53.6	46.7	17.7	11.76	7.78	8.07	2.71	2.13	4 Normal
86-87	63.4	59.0	57.5	19.0	11.85	7.60	7.86	2.83	2.30	1 Normal
Average percentage of normal of overbite cases.										
	96.17 %	92 %	94.16 %	103 %	99.29 %	100 %	98.72 %	96 %	93.36 %	



The jaw pressure was taken between the first permanent molars right and left side and between the central incisors in kilograms. The weight was also taken in kilograms and the sitting height in centimetres. Composition impressions were taken.

In addition to the 162 boys examined at this school, 91 boys from previous examinations that had the necessary head measurements were included, making a total of 253 cases; 144 of these had functional normal occlusion with an overbite of the upper incisors over the lower incisors less than half of the labial surface of the lower incisors. The remaining 109 had an overbite a half or greater than the labial surface of the lower incisors.

The statistics of each sitting height group of normal and of excessive overbite cases were separately added and the averages of each found. The percentage of normal of the average in each group of the excessive cases were calculated and then the average percentage of normal for all groups for each measurement found.

By this method a fair indication could be given as to the part played by any group of measurements in the excessive overbite cases compared to the normal.

In order to see if a small number of very marked cases of excessive overbite would show an increased difference with normal, seven models were selected, where there was no mutilation and their statistics worked out in a similar manner.

TABLE III.

AVERAGES OF 7 MARKED EXCESSIVE OVERBITE CASES, WITH PERCENTAGES OF NORMAL IN OVERBITE CASES.

Sitting Height.	Weight.	Right Molar.	Left Molar.	Incisor.	Nasion Sub-mental.	Nasion Incisor.	Nasion Molar.	Lower Incisors Sub-mental.	Lower Molar—Lr. bord Mandbl.	No. of Cases. Type.
cm.	kg.	kg.	kg.	kg.	cm.	cm.	cm.	cm.	cm.	
70-71	34.17	42.7	43.3	16.5	10.39	6.81	7.23	3.05	2.46	Normal
	34.6	39.0	39.2	19.2	10.38	7.01	7.34	2.26	1.72	4 Excessive
	101.2 %	91.1 %	90.5 %	116.3 %	99.9 %	102.9 %	102.1 %	70.8 %	70 %	
72-73	37.08	39.9	41.5	14.2	10.55	7.06	7.45	2.77	2.17	Normal
	36.2	41.0	43.0	22.0	10.82	7.16	7.46	2.60	1.77	1 Excessive
	97.6 %	102.7 %	103.6 %	154.9 %	102.5 %	101.4 %	100.2 %	93.8 %	81.5 %	
74-75	38.8	46.7	46.7	17.2	10.52	6.91	7.41	3.02	2.39	Normal
	38.5	41.0	42.0	83.0	10.65	7.15	7.32	2.70	1.92	1 Excessive
	99.2 %	87.8 %	90 %	17 %	101.2 %	103.5 %	98.3 %	89.4 %	80.3 %	
76-77	45.37	48.5	49.5	22.0	11.04	7.36	7.58	2.89	2.10	Normal
	42.10	35.0	40.0	13.0	10.23	7.22	7.26	2.38	1.96	1 Excessive
<i>Average percentage of normal in marked overbite cases.</i>										
	97.7 %	88.4 %	93.2 %	86.8 %	98.8 %	101.5 %	97.6 %	84.07 %	81.27 %	

The obvious conclusions to be drawn at the first glance at the statistics are the measurements of the skulls are comparable to a large degree proportionately to those of the normal boys except in the depth of the lower jaw in the incisal and molar region. Here the jaw diminishes in depth from the Saxon skulls, to the British skulls and still further to the normal boys. When one looks at the percentages of the general averages of the excessive overbite cases, this diminution in the depth of the lower jaw has become much more marked and even more so in the seven selected cases of marked excessive overbite (Figs. 2 and 3).



Very little difference is seen in the measurements of the normal and excessive overbite boys from nasion to submental point and nasion to the incisors. Slight decrease in the nasion to molar measurement. Considerable decrease in the molar pressure, but the incisor pressure was most inconclusive as the variations in this test were enormous, from 50 per cent. to 207 per cent. in the general averages, and from 17 per cent. to 154 per cent. in the selected cases.

I do not think one can escape from the conclusion that function, or rather lack of function, must be responsible for the gradual reduction in the depth of the lower jaw from the Saxon skulls to our own modern overbite cases. There have not been sufficient cases to be able to state whether this lack of muscular pressure is the same in the incisor region as in the molar region.

The percentage of decrease in the depth of the jaws in the molar region is more marked than in the incisor region, and certainly it was a revelation to me that excessive overbite was not caused by an increase in the lower incisal depth with very few exceptions.

The majority of cases were caused by a greater deficiency in the lower molar region compared to the lower incisal region.

In some cases it was difficult to see how the overbite had come about, the measurements compensating each other, and it was felt that it would be necessary to take horizontal as well as the vertical measurements in order to see whether lack of forward growth of the mandible was the deciding factor. This presents certain difficulties. The prosopometer measures from the external auditory meatus to the incisors. It is not a horizontal plane and it is not nearly at right angles to the vertical measurement, but rather an oblique plane and consequently it would be influenced by increased vertical growth. It will be necessary to devise some method of getting the measurements taken parallel to the Frankfort plane.

The addition of the averages of the measurements from the nasion to the upper incisors and the lower incisors to submental point should be somewhat more than the averages from the nasion to the submental point in overbite cases, but in the measurements of the boys the addition was less. It is curious how this has come about as almost all the boys had an overbite of the upper incisors over the lower. Apparently the nasion to the submental point is the measurement at fault. It is the most difficult measurement to obtain accurately.

Mr. McKeag and I both feel that this incomplete investigation has thrown quite a new light on the problem of excessive overbite and that it may be well worth while to continue the investigation much further, and if possible to extend it to children from 4 to 7 years of age.

#### DISCUSSION.

Mr. NORTHCROFT said he had been very interested to hear the results of Mr. Sheldon Friel's painstaking investigation. The one point which had struck him had been whether Mr. Friel was not overstressing the power of function in its effect on development. The members would recollect that Lundström, in his original monograph, had belittled the overstressing of function which had been going on





# FURTHER INVESTIGATIONS CONCERNING MUSCLES AND THEIR RELATION TO THE GROWTH OF THE JAWS.

BY SHELDON FRIEL,  
M.A., M.DENT.SC.

Fig. 1

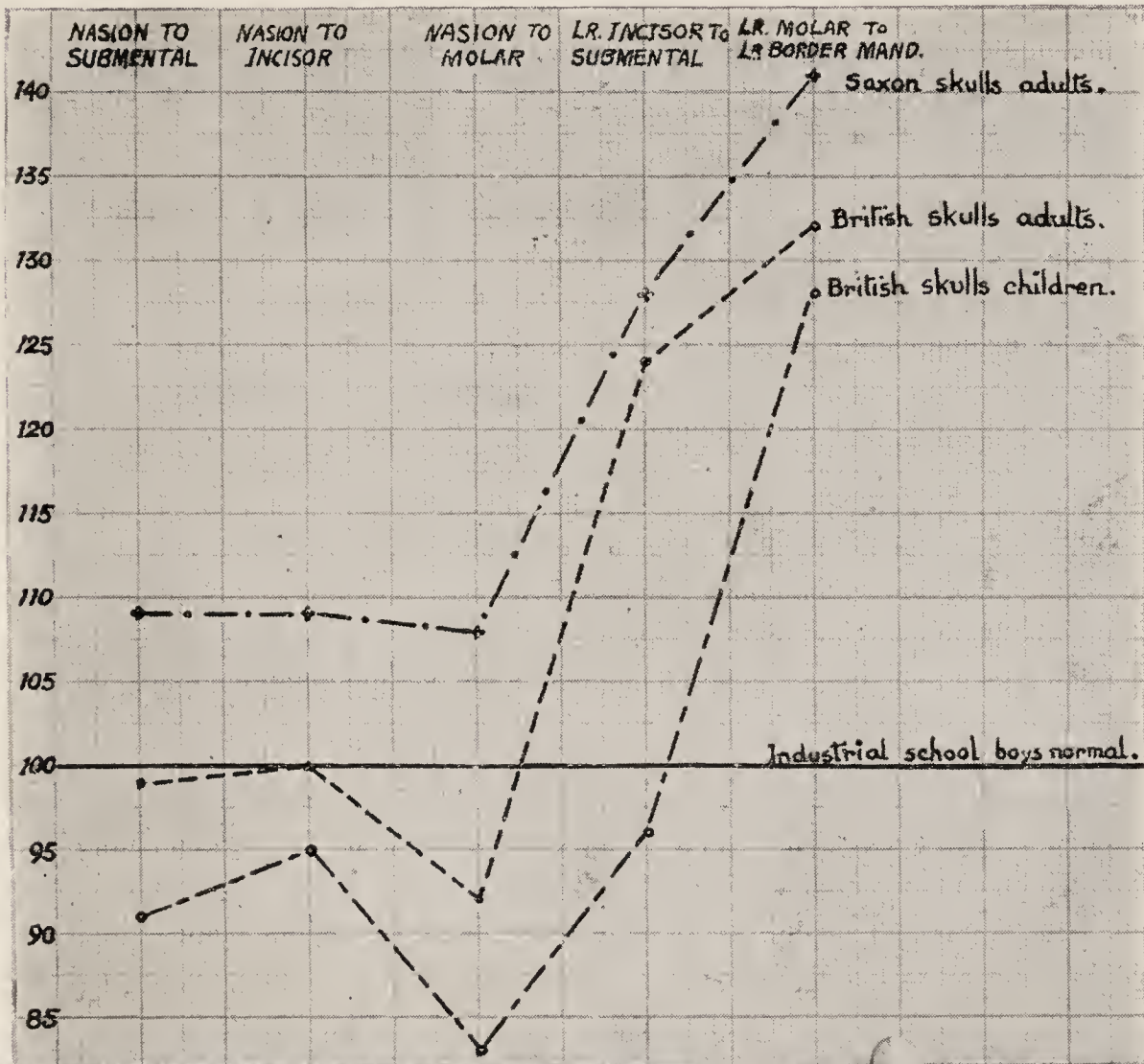


Fig. 2

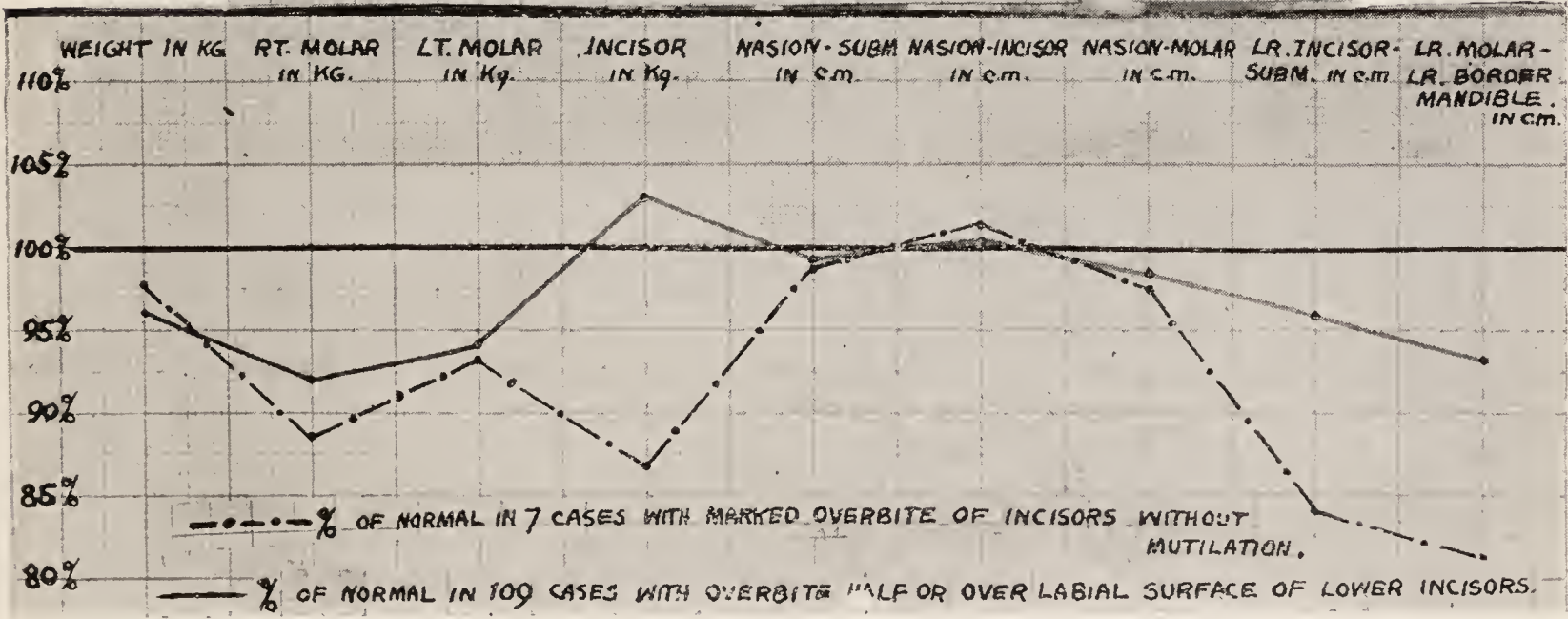


Fig. 3



# ROTATION OF MOLARS

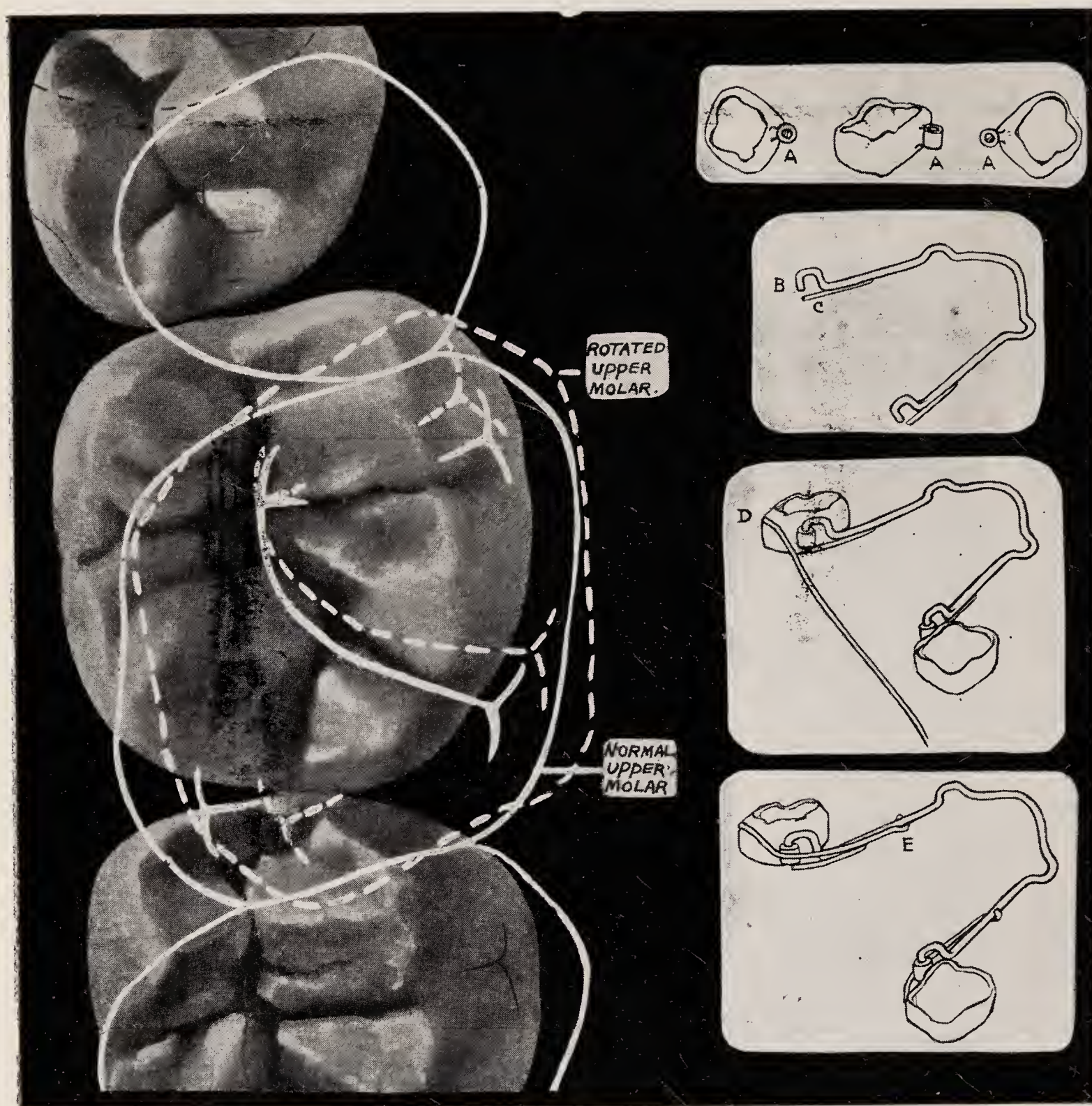


Fig. 1.

Fig. 2.

Illustrating Mr. SHELDON FRIEL'S Communication.



in the profession previous to his paper ; and personally he could not help thinking that in the case of the Bideford-on-Avon Anglo-Saxon skulls the development of those jaws had not been entirely due to the functional use of the jaws as jaws, but probably due to the whole development of the skeleton of the individual. If one took the jaws as functioning entities, one probably got the jaws functioning at their greatest activity with the Eskimo, and one certainly did not get anything like the growth of jaw bone in the Eskimo which one did in those Anglo-Saxons ; and he could not imagine that the Anglo-Saxons chewed any harder than the Eskimos. If he understood Mr. Friel rightly, he drew the conclusion that the Anglo-Saxon jaws were so developed because of their excessive function.

Mr. A. T. PITTS said he would like to raise a point about the changing occlusion to which Mr. Friel had drawn attention. Mr. Friel stated that in young children of about 3 there was a normal degree of overbite. He also suggested that the occlusion altered at about the age of 5 to 6 and became an edge-to-edge bite so far as the incisors were concerned. A good many years ago Mr. Warwick James had made the same statement. Personally, he had been interested in that point for some years, although he had not taken any actual measurements. During the last six or seven years he had been observing a considerable number of children, and he had rather come to doubt whether that statement was correct. At first sight it certainly looked as though it was, because in any number of children about the age of 5 one noticed that in a large percentage of them there was the spacing which should occur. One found also that the overlapping of the upper incisor teeth had been worn away, and that there was a very definite wearing down of the deciduous canines. When those children were told to bite, their jaws closed and the incisors met edge to edge ; but with a little perseverance one found that those children could bite back. It was a little difficult to define exactly what occlusion was, but it roughly meant that the condyle was in its most posterior condition, and that such a thing as a bite of convenience was excluded. It seemed, therefore, so far as his own observations went, that the wearing down of the incisors was due to the fact that the range of movements in young children was chiefly in a forward direction, with only a slight degree of lateral play. Although the movement of the incisor teeth in spacing produced an altered occlusal plane, yet the relationship of the upper and lower jaw remained approximately constant. He knew that others had shown undoubtedly there was a forward movement of all the teeth going on, but it had not appeared to him that the forward movement of the lower teeth occurred to a greater extent than the upper teeth, thus bringing the occlusion from the overbite position of the incisors to the edge-to-edge bite. In a certain number it was true that, so far as one could find, the bite was definitely edge-to-edge. Unless one had been able to watch the children over a period of two or three years it was difficult to be certain that they had not always had an edge-to-edge bite, because one sometimes did see such an occlusion in a child of 3 years of age, though he admitted it was rare. He raised the point because it was one of very great interest, and his own observations did not wholly coincide with those of Mr. Friel.

Mr. Friel said he thought the best answer he could give to convince Mr. Pitts was to show him models of children 7 years of age ; Mr. Pitts would see that the lower deciduous molars were more medial in their relation to the upper teeth than is the case in a 3-year-old child. The same forward relation of the molars is present just previous to the loss of the deciduous incisors.

Mr. H. CHAPMAN remarked that one saw it frequently stated in the journals that close bite was associated with very short crowns of the molars, and perhaps short roots of the molars. He would like to know



whether in his investigations Mr. Friel had noticed that to be a fact, or whether it was that the error was entirely in the depth of the basal portion of the mandible and not at all in the teeth themselves.

The Society was very much indebted to Mr. Friel for bringing such an important work before it.

Mr. NORMAN G. BENNETT asked Mr. Friel whether his close bite cases were in normal occlusion or post-normal, or mixed. There was a great difference between the two. The close bite in post-normal occlusion was a consequence of the post-normal occlusion. True close bite was what one got with a normal occlusion in which, without being posterior to their normal position, the lower incisors impinged very firmly against the upper incisors, and one got proclination as a consequence.

Mr. SHELDON FRIEL, in reply, said that Mr. Northcroft doubted whether function was the cause of the lack of development of the lower jaw, and that the development in the Saxon skulls was not a true example of the result of function, and that he (Mr. Friel) should have examined Eskimos. Granting that the dynamometers were a test of function, the children who had close bite, and who were definitely limited in their function, undoubtedly had a lower dynamometer pressure than children with a normal bite. It was quite appreciable in one of the graphs he had exhibited, and they were really uniform in the molar region. In the incisor region it jumped about and was most inconclusive. Mr. Northcroft said that the Eskimos had not a massive type of jaw like the Saxon skulls. Mr. Friel did not like to differ from Mr. Northcroft, but he thought they had a deeper jaw, and he would measure one later to see. Mr. Chapman had asked whether the lack of development in the molar region was due to the crowns of the molars not being uncovered—not apparently out of the gum enough, or whether it was that the distance from the alveolus to the lower border of the mandible was too short. Personally, he thought it was the latter—that the alveolus and body of the mandible had not developed. Mr. Bennett had drawn a distinction between inferior post-normal arch relationship, overbite cases and normal arch relationship overbite cases. The subjects were all excessive overbites, but the seven selected cases were definite excessive overbites which were not necessarily associated with post-normal arch relationship; it was very difficult to have an overbite without a post-normal relationship of some degree. Although the post-normality might produce a close bite, it could also be produced by some buckling or want of growth of the arch. One could not separate them into two definite classes. If the case had normal arch relationship, one either had spacing of the upper incisors or crowding of the lower incisors.

## ROTATION OF MOLARS.

By SHELDON FRIEL, B.A., M.DENT.SC.

MR. SHELDON FRIEL exhibited an appliance for the rotation of molars. The rotation of molars, he said, especially upper first molars, was not so uncommon as was usually thought. Hellman had pointed that out several years ago, and had shown that what was an apparent inferior postnormal arch relationship was in reality only rotated upper molars and consequent alteration in the upper arch. In cases where there had been premature loss of upper deciduous molars, the upper first permanent molars frequently rotated and partially closed the spaces for the teeth anterior to them; upper molars usually rotated around the medio-lingual cusp. Personally he had had no satisfactory method of re-rotating



molars until he had devised this appliance. Fig. 1 showed in a diagrammatic form the result of rotated molars; fig. 2 showed the appliance. Plain bands were made for the molars, and round vertical tubes (*a*) were soldered as near the point of rotation as possible. An arch was made to fit the lingual surface of the dental arch, with vertical round pins (*b*) to engage the tubes. Latches (*c*) were soldered to arch to keep the pins in the tubes. Arch diam. 1 mm = .039 inch. Spring wire .47 mm. or .018 inch diam. was soldered at the disto-lingual angle of plain band (*d*) and the free end brought forward and wrapped around the leg of the arch (*e*). The spring shown in the diagram was the force that rotated the molar. The appliance was cemented in the mouth and allowed to remain for two or three months, in which time the rotation should have taken place. It was not desirable to keep on more spring than was necessary to get the correct amount of rotation.

#### DISCUSSION.

The PRESIDENT remarked that Mr. Sheldon Friel's appliance was another illustration of the importance of careful diagnosis. It required a certain amount of genius to evolve such appliances, which, he thought, were very wonderful.

Mr. N. GRAY said he had been using the method described quite a great deal, and it was extraordinary the way in which it did rotate the molars. Mr. Sheldon Friel had stated he used very thin springy wire. Personally he had been using a .030 wire and had found that then he had not needed latches on the little body wire.

Mr. NORMAN G. BENNETT asked whether Mr. Sheldon Friel thought the movement described was a pure rotation round the medio-lingual cusp, or a rotation combined with anterior translation? Personally, he thought it was combined with translation. In other words—to put it the other way round—he thought that when an upper molar moved forward it also rotated.

Mr. NORTHCROFT suggested that it must be remembered that there was always the forward drift of the molars anyway. Undoubtedly only the rotation was corrected, but the teeth would move forward in any event; so that it did not much matter if this forward movement was not corrected.

The PRESIDENT asked Mr. Sheldon Friel what advantage he found over the method he had described as compared with that which had been suggested by Professor Johnson?

Mr. SHELDON FRIEL, in reply, said he had forgotten to mention one thing, namely, that the effect of the rotation was to take up the room of the teeth anterior to the first molar—not posterior to it; so that when one rotated the molar all the benefit was anterior to the first molar and not posterior to it. In reply to Mr. Bennett, personally he did not think it was necessary to have a forward translation combined with a rotation. One might have a rotation without the forward translation. He quite agreed that both were more commonly combined, but it would be seen that in the models of a lower jaw which he had passed round all that had been done to cure that case had been to rotate the molars. It had not been moved bodily backwards; it had only been rotated, and the two premolars had come up into place. The President had asked whether the method was better than Professor Johnson's method. He could only say that when Professor Johnson had been in London he had shown him this method, and Professor Johnson had passed it; that had been all he had been able to get out of him on the matter. Personally he had never tried Professor Johnson's method.



## FACIAL MEASUREMENTS.

By Miss K. C. SMYTH, L.D.S.

(1) This series of measurements has been undertaken for the Dental Committee of the Medical Research Council.

The object of the work is to establish the direction and normal rate of growth of the jaws of children between the ages of 8 and 14 years, with a view to comparison with the abnormal.

The system of measurements was originally devised by Mr. G. G. Champion, of Manchester, and so also were some of the instruments used.

### (2) SELECTION AND CLASSIFICATION.

The children to be measured are selected from the London County Council schools. The only *sine qua non* in the selected cases is "normal occlusion" of the teeth. Only the most trivial variations from what is generally recognised as normal occlusion are included. This high standard results in a very small percentage being selected. As an actual fact it is about 6 per cent., but this is not quite so depressing as it sounds, because many more cases would be suitable but for the loss of one or more of the teeth which are points from which measurements are taken. This of course does not necessarily imply abnormal occlusion, but it does make the cases unsuitable for the purpose for which they are wanted. On the other hand, if any teeth which are not points for measurement are missing, and the spaces are properly maintained, such cases are included.

Both sexes are examined, and the names of the children selected are taken. Subsequently these cases are classified according to sex and age. There are twelve six-monthly age-groups in each sex, between the ages of 8 and 14 years, and each group is to contain fifty cases, from which the averages of the figures are to be obtained. The average age of each group is to be obtained, and the average increases of weight and height. Weight and height (in ordinary clothes, without shoes) of each child is recorded within a few days of the taking of the facial measurements.

All the above work is carried out single-handed, so as not to waste time when help is not required.

### (3) THE MEASUREMENTS AND INSTRUMENTS.

There were originally five groups of measurements and twenty individual measurements taken in each case.

<i>Groups.</i>	<i>No. in each Group.</i>
(i) Antero-posterior group contains	5 measurements
(ii) Depth of palate       "       "	1       "
(iii) Breadth of face       "       "	2       "
(iv) Length of face       "       "	6       "
(v) Breadth of teeth and dental arches	6       "

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20

(vi) A sixth group, i.e. Length of dental arches will shortly be included.



(i) *Antero-posterior.*

These five measurements are all taken from the *transmeatal axis* to various points on the face :—

- (a) the Nasion.
- (b) the Gum Margin of Upper Incisors.
- (c) the Incisive Margin of Upper Incisors.
- (d) the Gum Margin of Lower Incisors.
- (e) the Mental Point.

All these are taken with the prosopometer devised by Mr. Norman Bennett in conjunction with the Cambridge Instrument Company, which was demonstrated a few months ago, and which is here to-night if anyone wishes to see it. Its accuracy, which is much greater than that of other similar instruments, depends chiefly on its two pressure gauges. The one in the headpiece exactly balances the whole instrument on the top of the head, thus avoiding distortion of the *transmeatal axis* by dragging of the earpieces ; the other, situated in the crossbar which carries the pieces of vulcanite actually used for taking the measurements, eliminates differences due to variations in hand-pressure and compression of soft parts. Thus it is an instrument which can be used, with a little practice, by any two people, with results which are in every way comparable with those obtained by any other two with a similar one.

(ii) *Depth of Palate.*

This has been taken, up to the present, with a simple instrument which is probably known to everyone. It consists of a flat bar of metal, which is held horizontally across the upper arch, in contact with the cusps of the upper first permanent molars. A plunger passes through the centre of the bar, at right angles, and is adjusted by turning a guiding cogwheel which engages with teeth cut in one side of the plunger. The latter is graduated in millimetres. In practice this instrument has been found unsatisfactory, owing to the cogwheel slipping, and a new one is being made as designed by Mr. Champion, which is much easier to adjust and to read. The plunger is cylindrical and moves through a sleeve, while additional security is provided by a small metal spring impinging on the side of the cylinder, preventing slipping. This instrument also combines an ingenious arrangement for taking the length of the arches, which will be described separately.

(iii) *Breadth of Face.*

These two measurements are taken with calipers, the ends of which are protected by special attachments which prevent the sharp points hurting the face, while they do not actually keep the points away from contact with their objectives.

(a) The distance between the most prominent points of the *zygomatic arches*. These points are first roughly gauged as being on a line passing from the external auditory meatus to the angle of the eye. The calipers are held horizontally, scale upwards, by my assistant, Miss Still, who stands in front of the child. She does not control the position of the calipers, but takes the weight and follows my movements as I palpate the *zygomatic arches* from behind the child, with the ends of the calipers between my fingers and thumbs. When the correct position is found, Miss Still closes the calipers gradually ; when no lateral play can be felt with both hands resting on the sides of the head, and the calipers pressed from side to side, the reading is taken.



(b) The *Bigonial* measurement is taken with exactly the same procedure as above, but it is more difficult to find the correct points on the angles of the jaw. The head is tilted backwards to make the angles as accessible as possible.

(iv) *Length of Face.*

All of the first four of these measurements are taken from the nasion. The fixed jaw of the calipers is fitted into the nasion by means of a conveniently shaped attachment which is hinged so that the calipers can be rotated to bring the movable jaw into any required position on the midline of the face or jaws. The hinge attachment is secured firmly in position with the finger and thumb of the left hand, the rest of the hand resting on the child's head. The pressure causes a mark on the skin over the nasion, on which the hinge can be accurately fitted for subsequent measurements. The movable jaw is adjusted with the right hand, and if it is approximated too much, a pull is felt at once by the finger and thumb at the nasion; this forms a test as to the correct adjustment.

(a) Nasion to sub-nasal point.

This is difficult to take correctly owing to the variable amount of soft tissue.

(b) Nasion to upper incisors, incisive margins.

The movable jaw is adjusted so that it just touches the teeth when it is swung inwards and outwards, without pulling on the nasion.

(c) Nasion to occlusal surfaces of first permanent molars.

Another attachment is fitted on the movable jaw of the calipers, carrying a crossbar which is swung into the mouth and adjusted to the anterior cusps of the upper molars.

(d) Nasion to sub-mental point.

This needs careful adjustment in order to get the instrument really on the border of the mandible.

(e) Lower incisors (incisive edge) to sub-mental point; and (f) Lower first permanent molar to lower border of the mandible.

Both these are taken with the calipers which are used for the breadth of the dental arches. The jaws have flat prolongations which grip the mandible and the teeth. The calipers are held so that these prolongations are at right angles to the long axis of the tooth. The reading is taken to tenths of a millimetre, with a vernier.

(v) *Breadth of Teeth and Arches.*

(a) and (b) are the width of the upper centrals and laterals. These were recorded for some hundreds of cases in both sexes, and the averages determined, and now the measurements are discontinued, as they afford no indication of growth-increases.

(c) Distance between 1st temporary molars or 1st premolars (upper).

(d) Distance between 1st permanent molars (upper).

(e) Distance between 1st. temporary molars or 1st premolars (lower).

(f) Distance between 1st permanent molars (lower).

All these measurements used to be taken actually between the teeth, from the lingual aspects, at points on the gum margin which are the nearest to each other.

It was thought, however, that external measurements were more suitable, so the calipers now in use were designed to take these.



The jaws are curved so that the breadth between the buccal surfaces (at the widest apart points) can be spanned without undue stretching of the mouth.

(vi) *Length of Arches.*

(a) Upper.

(b) Lower.

The distance between the distal borders of the first permanent molars and the labial surfaces of the central incisors will be recorded in future with Mr. Champion's instrument. It has steel flanges attached at right angles to the crossbar which rests on the cusps of the molars and these spring up behind the distal borders of the teeth. The instrument is T-shaped, the springs lying on the crossbar, and the measurements being taken by a slide working on the stem of the T, which is graduated.

#### (4) RESULTS.

An interim report was given in January of this year. The averages were taken for twelve-monthly age-groups, as there was insufficient material for the smaller groups, and even so the numbers in some groups were very small. The table shows the increases very well on the whole, the discrepancies being accounted for in almost every case by insufficient numbers in a particular group. There were most inconsistencies in the breadth of arches group of measurements, and even now that the averages are more dependable, there are indications that very little, if any, growth will be demonstrated between any two consecutive age-groups.

The five antero-post: measurements are omitted from this table, because Mr. Norman Bennett's prosopometer had only recently been completed, and it had been found that the old method was inaccurate.

Graphs were prepared to show the increases, but of course they are made ridiculous when the small numbers in one group give a false average. However, some of them are interesting.

It goes without saying that this January report has no permanent value, but was made simply to give an idea of how the work was progressing.

Up to date, about 700 cases of the required 1,200 have been completed, and the 13 and 14 years groups in both sexes are practically filled up. There is going to be great difficulty in filling up the younger groups, as almost every child between 8 and 10 either has badly carious temporary molars or has had them extracted. It is most depressing to see such a very small minority of whole temporary dentitions, whether normal or abnormal.

I am afraid this paper is rather full of figures, and may have bored many people. It is much longer than I had intended, but it was difficult to make it complete in a smaller compass, so that, in conclusion, I hope you will forgive its length, and only remember the object of the work, with an impression that no trouble is being spared in order to obtain accurate results in every detail.

#### DISCUSSION.

The PRESIDENT said that Miss Smyth was to be heartily congratulated on a very arduous and painstaking work, and on the interest which she had apparently shown in it. Very valuable results were bound to be obtained from the completed investigation. He presumed the work



had been carried out in conjunction with other factors such as diet, health and early feeding.

Mr. NORTHCROFT remarked that Miss Smyth had brought out one point which to him was very interesting because it bore out his own observations on the subject, and that was the difference in measurements of the width of the deciduous and permanent arches was complicated by the great differences between the labio-lingual diameters of the deciduous and permanent teeth. In the same mouth some deciduous molars were broader than the succeeding premolars, and some were narrower. Therefore he thought it was wise that all the measurements should have been taken from the outside rather than from the inside of the mouth.

Mr. PITTS said he desired to ask a question bearing on the same point, namely, whether in any particular age group—taking the lower jaw—it was the distance between the first temporary molars, or the distance between the first premolars (if they were present) which was taken, and if both measurements were included in that age group? If in an age group there were ten children with the deciduous molars present, and their measurements were taken, and thirty children with premolars, and those measurements were taken and included together in the age group, it would seem to introduce the fallacy which Mr. Northcroft pointed out. In the case of the lower deciduous molar the bucco-lingual diameter was usually less than that of the premolar, and in the upper deciduous molar the bucco-lingual diameter might be greater. It seemed to him either it should be limited to the distances between premolars or to the distances between deciduous molars.

Miss SMYTH replied that it was not settled yet by the authorities as to whether it should be limited to either one type of teeth or to the other. At present she had them mixed; but she always made a note of whether they were premolars or temporary molars. She did not know whether Mr. Bennett had any information on the point.

Mr. N. G. BENNETT said he thought Miss Smyth was in the happy or unhappy position of being in the hands of the Statistical Department of the Medical Research Council. There were wonderful mathematicians who told the dental practitioners what he or she ought to do; they stated whether the numbers were sufficient to provide averages for the different age groups, and whether they could make curves and graphs which might be regarded as reliable. In that matter the dental practitioner did exactly what she was told. She would probably be told that she must eliminate either the temporary molars or the premolars, or that graphs would be constructed for each separately. Personally, he did not know which it would be; neither did Miss Smyth, but they lived in hopes.

AN ordinary meeting of the Society was held at 11, Chandos Street, Cavendish Square, W.1, on November 7th, 1927, Mr. H. C. HIGHTON, President, in the Chair.

The PRESIDENT announced the death of Mr. L. F. Morris, of Bournemouth, and the members upstood as a mark of respect and regret.

The minutes of the last meeting were read and confirmed.

Mr. William Richard Parker, L.D.S.Eng., Country Press Chambers, Edmund Street, Brisbane, was unanimously elected a member by a show of hands.

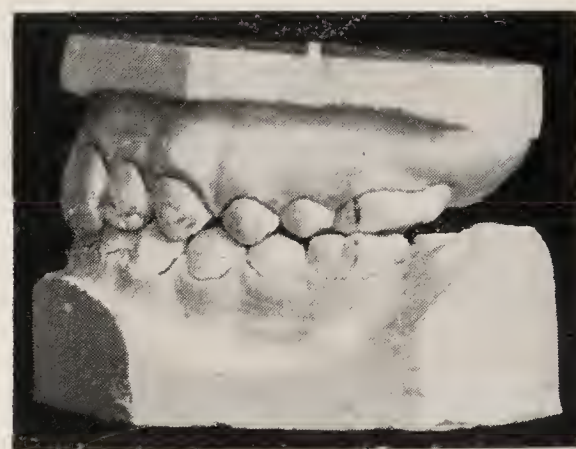
Several gentlemen were welcomed as visitors.

#### SHORT COMMUNICATIONS.

Mr. C. S. MORRIS read the following communication on "HISTORY OF A CLASS THREE CASE":—

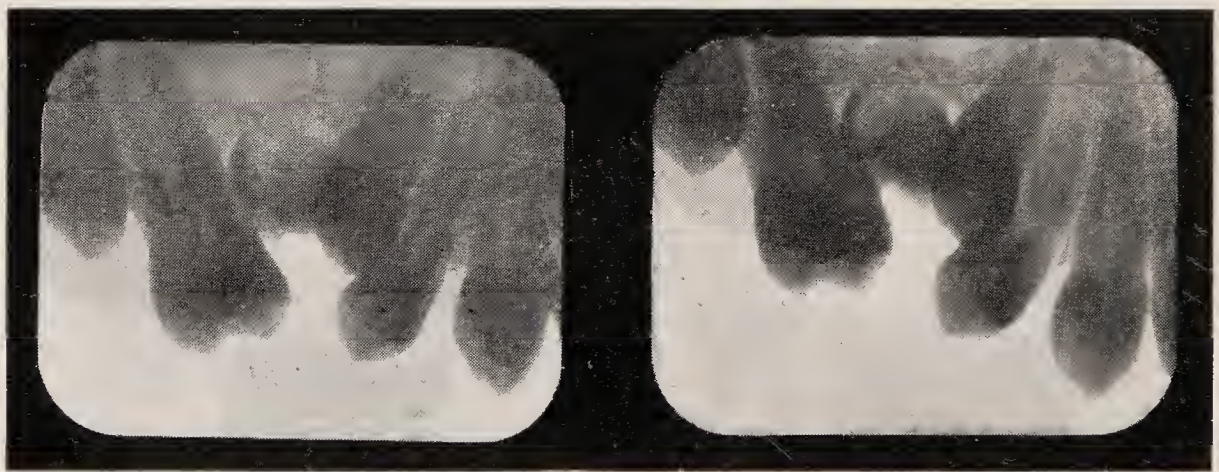
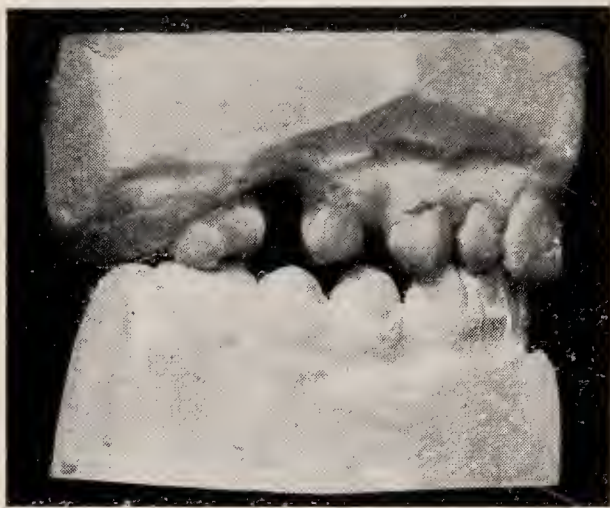


A CLASS III CASE.



Illustrating Mr. C. S. Morris' Communication





Illustrating Mr. S. G. Townley's Communication.



" This Class 3 case has been treated with intervals of rest since 1922, and is now complete.

The condition when started was as is shown by the models in No. 1.

" An upper external arch was put on in that month. This arch had a wide German-silver band soldered inside it, 3-16ths of an inch wide, in order to take the weight of the lip off the teeth.

" In December it was seen that the upper deciduous incisors were moving forward, as it was hoped that they would.

" In January, 1923, the deciduous lower canines were extracted in order to allow the lower incisors to fall back. In April of that year an upper Mershon arch was put on to push the permanent centrals forward. By November the alveolar process was developing well, with an upper central overbite 1-16th of an inch, as is shown by the models No. 2, when finger springs had to be put on to rotate the laterals.

" In November, 1924, the first deciduous molars in the lower jaw were extracted to allow the permanent canines to fall back. These came almost into line without any further treatment, but were still a little outstanding.

" In October, 1925, the second deciduous molars were extracted and a Mershon arch put on resting against the lingual sides of the lower incisors to keep the molars from travelling forward in the normal way. By this means the whole of the space occupied by the deciduous molars was reserved and the lower canines able to fall back in normal relation with the rest of the arch.

" In February, 1926, the upper second deciduous molars were extracted as the first molars were inclined to erupt behind the lower molars, and were in danger of being locked there. These rapidly travelled forward, and then a Mershon arch was put on the top to keep them there.

" An arch was still being worn because the second upper right bicuspid had erupted on the palate, and was not yet in position when the case was shown at the November meeting, as is shown by the models (dated October 18th, 1927, No. 3)."

The PRESIDENT said that he would like to inquire whether the upper jaw was undeveloped, and if the lower jaw was over-developed. He gathered that Mr. Morris had not used any inter-maxillary traction in the case?

Mr. MORRIS replied that he had not.

Miss POSSENER inquired whether Mr. Morris had given any expansion to the maxilla.

Mr. H. C. VISICK remarked that it struck him as being an astonishing thing that the front teeth were not more inclined after having been pulled forward. From the appearance of the first model one would imagine that in pulling the centrals forward they would be tipped right out, and he did not quite understand how they had not got tipped out.

Mr. H. CHAPMAN asked Mr. Morris whether, when he had put on the buccal arch in the first instance to hold the lip out, any inconvenience to the lip had resulted from that? It seemed to him that if the lip were actually causing pressure on the upper incisors, the lip would press equally on the arch, and a great deal of discomfort arise. Did Mr. Morris use any apparatus at all on the lower teeth? He congratulated Mr. Morris on the excellence of his result, and the ease with which he had obtained it.

Mr. B. SAMUEL said he desired to give his meed of praise to Mr. Morris, on the fact that Mr. Morris had not found it necessary to take the advice which had been given him at the former meeting, of extracting several teeth. The case went to prove that it was not necessary to prop and gag the bite in order to bring the upper incisors over the mandibular teeth.

Mr. H. C. VISICK, adding to his previous remarks, said that as Mr.



Morris had had to wait for a year or two, as the patient was so extremely nervous that he could not fit any appliance in the mouth, he (Mr. Visick) wondered why Mr. Morris had not tried a chin-cap and a head-cap. Personally he had treated one Class III case at the age of 18 months. By fitting a head-cap and a chin-cap for less than three months, the patient had had his jaw pushed back into position. The boy was now about 12 years of age, and his teeth were perfectly normal. From his experience in that case it occurred to him that the earlier one could start on such cases the better. He had had one other case on which he had commenced at four years of age, and that had also gone off very well.

Mr. B. MAXWELL STEPHENS said that his partner, during his absence on one occasion, had treated for him just such a case as that which Mr. Morris had described that evening, but in doing so had made use of the chin-cap. What was now particularly noticeable in contrasting the two cases was the absence of growth antero-posteriorly, and the advantage of the natural sequence in development brought about by the method of treatment Mr. Morris had adopted. If movement forward in the pre-maxillary region was not obtained, then there was apt to be a lamentable imbrication of the lower incisors.

Mr. H. G. WATKIN stated that he had had a case, age three, on which it had not been possible to put much appliance. The case was not so much exaggerated as Mr. Morris's case. All that it had been necessary to do had been to put two small inclined planes on the upper central incisors, and in a very short time that had brought the upper jaw forward, and in about three months the jaw was normal.

Mr. C. S. MORRIS, in reply, said he had not used any inter-maxillary traction at all, and he had not used any expansion except what he had done with the finger-springs on the Mershon arch on the upper jaw in order to carry the incisors forward in the normal position, and also the canines when they erupted later on. Mr. Visick had asked whether there had been any tipping. There had been no tipping—for two reasons, one being that he had started as soon as ever he could get a finger-spring on to the incisor tips, and the other being that the patient began to develop the alveolar process which carried the roots of the teeth steadily further forward. At one stage the incisors were certainly more tipped than they are at present. Mr. Chapman had asked about the pressure on the lip. He (Mr. Morris) had expected to find the deciduous molars move back a little if there was going to be much pressure on them, but it had not appeared to have had any effect upon them whatever. The band was three-sixteenths of an inch wide; it was no use putting a narrow band on. He had not put on any apparatus at all to pull back the lower incisors. They fell back from the pressure of the lower lip. What he had been anxious about was that the molars might tip forward when the deciduous molars were gone and deprive him of the room necessary. He had had to get the canines and premolars in position, so he had put on a Mershon arch resting against the incisors below and had kept it there all the time. That was all the apparatus he had used below. He noticed that at one time the patient had a tendency to crumple up her incisors—he supposed under the pressure of her lip. Therefore, he had kept a finger-spring on the left lower lateral. He had not had to do any extraction at all to make room. That point had been debated two or three times, but nothing had been done. Mr. Visick had asked about a head-cap. When the patient had first come to him he had thought she was just the child on which to fit a head-cap; but the more he looked at her the more he had thought that the condition was not due so much to the position of the lower jaw as to the condition of the maxilla, and had not put on a head-cap. He had thought that if he could get the upper jaw developed he would probably cure the case. Mr. Maxwell Stephens had mentioned the necessity of having the expansion on the upper jaw as well as



retraction by a head-cap. Personally, he had not had much experience of such cases, and he could quite imagine that that would have to be done in order to get a good result. Mr. Watkins had referred to the inclined plane. Probably all the members had treated quite a number of cases with an inclined plane in which they had got the commencement of a Class Three case by there being two centrals inside the lowers. He thought most of such cases if left alone would gradually become Class Three cases. He thought that with an inclined plane or a Mershon arch the upper incisors would go over the lower incisors without the necessity of having to raise the bite at all, and the case would nearly always cure itself automatically.

Mr. S. G. TOWNLEY then presented a short communication, illustrated with slides. The patient, a girl of 11 years of age, had been brought to him with a swelling in the palate. He found that the swelling was due to the eruption in the palate of the second premolar. The second premolar was just coming through, but the temporary molar was in place. He had taken an X-ray photograph, and found there were no roots to the temporary molar, and, with some difficulty, had extracted it. It had been a very difficult operation, because the temporary molar was hopelessly wedged between the six and the four. The six was very badly tilted forward. The articulation on the other side was quite satisfactory, but on the one side it was obviously very bad. What had seemed to him to be difficult was how to straighten up the six without opening the bite. The four had drifted back, and could be brought forward, and he thought the five would come into play; but he did not quite know how to strengthen up the six without opening the bite. He did not know why the temporary molar had never erupted. He invited assistance in the matter. (*Illustration opposite page 47.*)

Mr. H. CHAPMAN said the space for the second premolar could be opened up by means of a spring attached to the first premolar and the molar—that spring being attached by means of half-round vertical tubes on bands. The opening of the spring there would probably move the first premolar more than the molar, but he thought the anchorage could be quite easily made sufficient by means of a lingual arch attached also on both sides, and with spurs in the appropriate places to get resistance from the other teeth. He did not think Mr. Townley would have to open the bite in order to do that. He did not see why the molar should not be moved back without great difficulty. His colleague sitting next to him suggested that the deciduous molar had erupted and probably had got squashed down in some unaccountable way by the teeth next to it.

Mr. C. S. MORRIS said he thought that that was actually what had happened. One had seen a number of cases where the deciduous molars remained at the same level as they had always been. When the alveolar process deepened they seemed to be left behind. It was not always the fact that they were left behind, because the first molar was sitting on their tails; but he had seen two deciduous molars side by side doing the same thing—an eighth of an inch off the lowers.

Mr. S. G. TOWNLEY said the only point which had struck him about it had been that he had thought that if the six year old molar was rotated backward on its apex it would be bound to open the bite. Mr. Chapman said it would not, and if Mr. Chapman said it would not, he was sure it would not; but if it was brought perpendicular surely it would be longer than it was at present, and, if it was already in articulation with the lower molar, he could not quite see why it would not open the bite, at any rate temporarily.



## AN ATTEMPT TO SOLVE THE PROBLEM OF THE LAPSING OF TREATED CASES THROUGH THE STUDY OF INTERNATIONAL ORTHODONTICS.\*

By A. C. LOCKETT, L.D.S., R.C.S., Eng.

THE study of international orthodontic history, conditions and problems has always been of interest to me, and has become increasingly so of recent years. The First International Orthodontic Congress, held in New York in August, 1926, has, perhaps, done more to make this study of greater interest to us here in Europe than anything that had happened previously. This interest cannot but grow into greater proportions in the future. Those of us who were fortunate enough to be present at that Congress organised by the American Orthodontists through the agency of their efficient President and Organiser, Dr. William Fisher, Dr. Waugh, his Secretary, and his band of helpers were amply repaid in ways too numerous to mention for the visit—yet mention must be made in a spirit of appreciation of the lavish kindness and generous hospitality which our American friends bestowed on all the members of foreign countries who attended the Congress. The Congress was a great success, and so satisfied were the organisers of the good which resulted that I believe I am giving no secrets away when I state that there is a prospect and hope that in the year 1930 we shall hold the Second International Orthodontic Congress here in Europe. Plans are already afoot for bringing this hope into the realm of a certainty. Speaking unofficially, I think I am right in saying that the governing body of the First International Orthodontic Congress has power to act until a second governing body has been elected, and I believe this first governing body can and will decide the place and time of meeting for the Second Congress. It is not unlikely that London may be selected, and I believe this selection will prove to be a wise one. May I, therefore, be permitted to make a few suggestions for our consideration in the event of London being selected:

The creation and formation of the Second International Orthodontic Congress would come together easiest on the following lines:—

The British Society for the Study of Orthodontics should be asked to be the central local organising body in conjunction with the existing working organisation of the British Dental Association; an outline of all the duties of these two bodies is not necessary at the moment.

The American Society of Orthodontists through its Inter-relations Committee should be asked to take charge of the Western Hemisphere as it appears on the map.

The European Orthodontological Society with an Inter-relations Committee should be asked to co-operate with the American Society of Orthodontists Committee and take charge of the Eastern Hemisphere.

A plan of this sort will distribute the work and responsibility and meet the requirements of organising a successful Congress.

Our duty here in Europe and the British Isles is, I feel, one of some responsibility to keep this Second Congress in our minds and in our studies and work, so that we may at that time present

\* Given at the Meeting, November 7th, 1927.



to our foreign confrères a true and organised picture of our requirements, our difficulties and the problems which, from day to day, call for solution in our practices; we will, in like manner, be ready to receive our American friends and those of the countries and parts of the British Empire outside of the European belt of nations in the same spirit as we shall ask them to meet us.

The organisation of this Congress is going to be one of some difficulty, and we here in the British Isles and in Europe will be expected to take some big and active part in its formation and operations. Looking back on the First Congress for a few lessons in the organisation of the Second, we find many points worthy of imitation. The two points which impress me most on which improvement is advisable are:—

(1) In place of a very long list of papers and little or no discussion, I would suggest a considerable reduction in the number of papers, longer and better machinery for discussion, and more of the question and answer procedure.

(2) On the assumption that the Second Congress lasts four days, I think that (a) two days should be devoted to and set aside for short courses of instruction by the recognised bodies of practical experience and thought on specified subjects of urgent importance, and that the men present should be divided into about eight groups to attend these courses in rotation; (b) half a day should be devoted to one or two interesting debates led by two men with their supporters and opposed by two other men with their band of supporters; this procedure would make an interesting afternoon.

The B.S.S.O. in its own quiet, dogged and typically English way has convinced me that there is no more broadminded and serious-thinking body of men on orthodontic problems in any part of the world to-day. I am proud of my membership and any small part I may have played in its early days. This Society owes much to all its presidents and officers of past years, but most of all to its early presidents, Messrs. Badcock, Northcroft and Sim Wallace, Mr. H. Chapman for his long, efficient, painstaking and unselfish term of office as Hon. Secretary. The mantle of this office has fallen on our promising and cheerful Secretary, Mr. Packham, and I can see a lively time in front of him leading up to 1930 and the Second International Orthodontic Congress.

The E.O.S. through its President and officers wishes to pay this Society homage and gratitude for its friendly and hearty co-operation in past years in its annual meetings held in London, and looks forward to years of cordial and sympathetic effort which, at the present time, strike me as being so necessary in the individual part which each Society will be asked to undertake in the organisation of the Second International Orthodontic Congress.

I propose to make some reference to the part Europe played in the First International Orthodontic Congress and to state my humble opinion on what I feel ought to be a general line of policy, which European Orthodontic Societies might do well to adopt as their considered conclusions, which European conditions of general practice and necessities of parents and patients demand.

It is true that the contributions in papers from members from Europe were not accepted by our American friends on scientific matters in the same matter-of-fact way as some of their own



valuable contributions; this was only natural. Let no one, however, conclude and imagine that deep in the hearts of the leaders of thought and action across the water these European contributions have been forgotten and unnoticed—far from it. We have always accepted their teachings and written experiences on their face value and put them to the test here in Europe. We have been told by many of our American visitors of the present political and scientific American orthodontic conditions, and we have told them of our own. There is a great deal of sympathy between us on this matter, yet for the purposes of the future we shall we well advised to leave domestic matters of other people alone. I have no fear but have every confidence in American orthodontic conditions being straightened out in a creditable manner in their own way and time.

What does concern us is our own, and I venture to hope that a few suggestions which I shall offer may be a small contribution towards outlining a policy and plan which will be a blessing to those of us who practice orthodontics in conjunction with general dentistry. We shall see more specialists in England and on the Continent in future than exist at present; I look forward to that. Nevertheless for the present the bulk of orthodontic treatment is and will continue to be done by the general practitioner for many years. There is much that a general practitioner can copy from the experience and teaching of the specialist, but the general practitioner has opportunities of observation over many years on his cases which the specialist has not. You will find that the general practitioner keen student of orthodontics will in future make many valuable contributions which specialists will be glad to imitate.

Now for the attempt at a solution of the lapsing of cases. It is a fact, generally accepted, that it is impossible to conduct an orthodontic practice successfully in conjunction with a general practice. I am in agreement on that for the simple reason that up to the present the teaching, methods and plans of treating cases and all the procedure relating thereto have been of a character eminently suited to the specialist only. The general practitioner was supposed to gather just what crumbs of comfort he could.

We cannot get away from the fact, whether we like it or not, that here in Europe, and certainly in the British Isles, orthodontic treatment is, and will continue to be, conducted in general practice to meet the needs and requirements of the people who are our patients, and it is up to us to see that orthodontic treatment in general practice is going to be possible, and map out for ourselves, in conjunction with experiences in other parts of the world, just what portions of those teachings and experiences are suited to our conditions, leaving alone what we find and know to be unnecessary or useless to us.

The basis of the plan and policy I wish to suggest should embrace the following characteristics, and it is based chiefly to meet the needs of the general practitioner student of orthodontics:—

(1) The rights and the best interests of the child in future years, after treatment, should be our first consideration, taking all the existing and future circumstances and conditions under which treatment is contemplated into account.



(2) The plan of treatment should be one which, as near as we can tell and know, will lead to an assured result, and one which will not lapse again into malocclusion. It should be as simple and short as possible and carried out according to a plan based on a correct diagnosis. If the diagnosis provides for extractions, these extractions should be the correct teeth at the most suitable time in relation to the future denture as a whole, and particularly so on the important factor of caries of the teeth, absorption of the roots and general inflammatory condition of the soft tissues.

(3) That our convictions born of experience and observation should be fearlessly stated, whether they are in agreement with what were supposed to be recognised modern laws or teachings, and that we should keep on saying so until someone can prove us wrong, on the standard of permanent results.

I admit that it is no easy matter to live up to all there is contained in this policy in the face of a large opposition in different parts of the world and here at home, but no harm will be done if we have a good try. It is a generally accepted opinion that treatment on the normal occlusion basis is desirable as an ideal; it is also known by the supporters of this ideal, as well as by its opponents, that normal occlusion from malocclusion can be and is accomplished, but it is admitted by all that permanent results in adult life in a very large number of cases cannot be promised. Thank Heaven we are all agreed on that, and on this point of agreement the hope and promise of the future exists. This interesting position appears to me much in the following light. Here is an agreement with a difference, the difference being that the normal occlusionist, i.e. the teacher and believer, who says that on no account should extraction be resorted to, is prepared to take the risk of malocclusion in the end of many cases, because he maintains that by the extraction of teeth you cannot have ideal occlusion, even if you do not get a relapse.

The opposition maintains that by extraction in certain cases carefully thought out in plan, you obtain a result which may not be ideal occlusion, but that your risk of a relapse is reduced to a minimum, and that the denture as a whole suffers least from causes not always under your control. The difference appears small, it is true, but that difference means an awful lot to the patient, and what is more, it means most to the practice of orthodontics and its desirable reputation which I feel ought to be safeguarded, and is to-day jeopardised.

The policy which I have suggested is, to all intents and purposes, one for the needs of the general practitioner student of orthodontics, and it is put forward with the hope that its adoption here or abroad will do more to safeguard the reputation of the orthodontic profession than anything else can do in years to come. This small difference in our point of agreement opens out a large field of operations and discussion which are full of possible errors and mistakes in both camps. Abundant evidence is provided by the many cases which one sees from time to time in practice which have been treated with extraction wholly unsatisfactorily simply for the need of a carefully thought out plan in conjunction with the extraction.

My experiences and observations in practice have convinced me



that, given an opportunity, under favourable conditions, of, say, six years for treatment and retention, there are certain types of cases, very much in the minority in England, which will respond to treatment without extraction, and that all other types will not remain in occlusion without relapse unless extraction is performed.

This lapsing problem, therefore, seems to hang on the word "TYPE." I have long felt the need of a classification of type, but have never been able to produce one. I was still more impressed with the necessity of a type classification to work with a malocclusion classification after reading that long and interesting article in the *International Journal of Orthodontia* of October, 1922, by Dr. Vancy E. Barnes, Cleveland, Ohio, who, I am told, practised orthodontia in general practice for years before he specialised. The paper is entitled "A Study of Third Molar Impaction Associated with Orthodontic Retention." It was with a feeling of grateful appreciation and joy that I came across a classification of racial types according to physical characteristics by Dr. Potter of Kansas City, and the more I see of it and its application in practice the more I am convinced that up to the present it is the best in existence, although there are some features of it I do not like. With his permission I will submit his classification to you in tabulated form and with, side by side, my interpretation of its relation to Dr. Angle's classification of malocclusion. (You will find it in the *International Journal of Orthodontia*, March, 1925.)

#### DR. POTTER'S CLASSIFICATION IN CONJUNCTION WITH DR. ANGLE'S CLASSIFICATION.

DR. POTTER.	DR. ANGLE.
<i>Racial Type A. Small Patients.</i>	
1. Both father and mother small.	Class 1. Class 2, Div. 2, and sub- divisions.
2. Small bone development.	
3. Usually underweight.	
4. Arches narrow and short.	
<i>Racial Type B. Average Patient.</i>	
1. Father large, mother small, or vice versa.	Class 2, Div. 1. Class 2, Div. 2.
2. Height and weight vary.	
3. Normal bone development.	
4. Arches usually wide—length varies.	
<i>Racial Type C. Large Patient.</i>	
1. Both parents large.	Class 1 (small percentage). Class 2, Div. 2, and sub- divisions (small percentage). Class 3 (large percentage).
2. Normal height and weight.	
3. Arches full as to length and width.	

*With apologies to Dr. Angle.*

You will notice that this classification deals with treatment, and not much is said about retention. For the purposes of simplicity I contend that all irregularities of the teeth brought about by a number of causes verge on a state of impaction—simple or complicated, visible or invisible. The actual correction of the irregularity or simple and visible impaction of all the teeth from



the first molars forward is to-day a comparatively straightforward operation, with occasional very difficult examples. If there were no second and third molars I do not believe this treatment of the teeth of both jaws from the first permanent molars forward would lapse again into malocclusion. The lapsing period commences on the arrival of the second molar in cases treated early, and on the arrival or attempted arrival of the third molars, and here we have the state of complicated and invisible impaction. I do not wish to be misunderstood. My reference to impaction of the third molar where irregularities of the teeth exist does not necessarily imply that the third molar is always apparently impacted; it may not appear to be, but it is for the reason that through lack of normal development it cannot find room for eruption—in other words, the wretched thing has no business there. If it were possible, by surgical means, to remove every third molar in every case on the earliest opportunity of a case of developing irregularity, I believe the lapsing problem would be considerably mastered, and certainly so in types of cases which seem to be more influenced or susceptible to lapsing than others. So far this is not practicable, and any attempt to perform this operation at the time it would be advisable and necessary would do a lot of harm in other ways. As this procedure is not advisable, we are driven to the unenviable thought of removal of the second molars where the condition of the first molars is good and free from caries or possible disintegration leaving the third molars to take their places.

Dr. Potter's contention is:—

(1) That in racial types A and B in his classification embracing Angle's Class 1 and Class 2, Divisions 1 and 2, if all the first molars are sound in health and good in structure there are racial types of cases which cannot accommodate the third molars on account of physical limitations, and that in these cases the second molars should be extracted from choice.

(2) If the first molars have large cavities, or a cavity which has been filled, and radiograms indicate that at some future time the closeness of the filling to the pulp cavity may bring about the death of the pulp, in this case he would extract the first molars, provided the second molar is in a healthy condition; two healthy molars should be left. On this point please let me say that in any case where the loss of the first molar is contemplated on Dr. Potter's grounds, it should be done three or four months before the eruption of the second molar. Doing it at this time, and at this time only, do you ever make it possible, without the use of appliances, for the second molar and second bicuspid to approach a normal point of contact in the strictly mutual position. He maintains that the age of the patient is the least important factor of the subject, and that where mandibular and maxillary development is not sufficient to accommodate the third molars and thereby permit an established occlusion of the other teeth, you are justified in extracting the second molars.

In cases where the third molars have erupted and brought about a lapsed result of a treated case he says one is justified in extracting the molar (first, second or third) which is in the most weakened condition; on this point I am not in complete agreement. It might easily be found that four of the bicuspid might preferably



be sacrificed, and that many other conditions had to be taken into account.

I am in entire agreement with Dr. Potter in saying that classifying cases by types of malocclusion only is not sufficient to obtain a comprehensive diagnosis, and that to obtain the correct diagnosis we need a combination of racial type classification according to physical characteristics, and the classification of malocclusion.

Now I will read you exactly what Dr. Potter says :

" This classification is the keystone of my diagnosis. In illustration of the use of the type classification, if you are handling a case of Racial Type A and Class 1 malocclusion, you can be definitely certain that in the majority of cases you will never have room for the third molars. So in your diagnosis and prognosis you must consider the effect of the third molar on your corrected occlusion. You will find the proportion of cases that will not accommodate third molars in Racial Type B to be about 75 per cent. or in the ratio of three to one.

" Type C is the only full classification that will accommodate the third molars. This type of patient is usually of the northern Scandinavian parentage, or from certain districts of Russia or Scotland. The pure negro also belongs to this type. No race will long remain within the Type C class that lives the modern life with its soft prepared food and lack of rough diet, as it is a known fact that the change in diet and living of the human race is gradually lessening the stature of the individual, and the degree of mandibular and maxillary development.

" By the application of the standard classification of malocclusion in correlation with our racial type classification, we are aided in determining the point, or points, in the mandibular or maxillary arches where we are desirous of obtaining bone development, and to better determine the time for the removal of the second molars.

" First we will take up the cases of those individuals who have normal maxillary and mandibular development, whose arches are practically normal, and whose general features are regular. In this class you will often find plenty of arch space, or bone alveolar development, to accommodate easily fourteen teeth in each arch ; but through arrested development of the bony structure in the angle of the ramus and the posterior part of the alveolar process, there is not sufficient space for the third molars. The result is that these third molar buds develop at an angle of approximately forty-five degrees, with the roots reaching down toward the adverse portion of the heel of the ramus, the cusps being pushed forward mesially and lingually, striking, and in a great many cases exerting pressure against the distal side of the second molar just below the enamel line of the tooth.

" I have noticed this pressure against the membrane surrounding the second molar in case after case. As a consequence, the second molar is moved heavily to the lingual, and often with considerable rotation on the tooth's axis. Every competent orthodontist, attempting to straighten up these second molars with their heavy lingual inclination, can have adequate proof that they have been moved to that position by the action of the impacted third molars, by a study of radiograms taken from three angles. We have found that this second molar in the mandibular arch almost defies any



amount of pressure that it is possible to place there to restore it to its normal position and maintain it securely, as long as the action of the third molar is allowed to remain.

" After carefully studying the cases I have had under observation, and working with some prominent exodontists along this line, it is my belief that in cases of this type it is better to remove the second molar and allow the third to move forward and erupt in a normal position, rather than to attempt the blocking and surgical removal of the impacted third molar, with the detrimental action that is likely to follow that procedure. We all know that in many mandibular cases the roots of the developing impacted tooth are around the heavy inferior dental nerve, coming down within the angle of the ramus ; and that it is also possible through the amount of the process necessary to be removed to so weaken the bony structure that a fracture of the jaw may occur at that angle.

" The question has been asked me a great many times whether the erupting third molar in this case would erupt in a manner that would establish occlusion or contact with the first molar. I have carefully followed out a number of cases, and in every instance observed the third molars have moved out to an ideal occlusion. The cases studied have been individuals between the ages of 16 and 24. It is not my contention that all second molars should be extracted where there are impacted thirds ; but in the type of case described it is my judgment that it is better to remove the second molar than to surgically remove the impacted third, with the possibility of injury to the bony parts.

" With this same type of case, in dealing with the maxillary arch, you can prove to your own satisfaction through careful use of radiograms, that in over 70 per cent. of the cases the impacted third molar is almost on a line with the first molar, taking the mesial portion of the impacted third and the distal portion of the first ; because in such cases the action of the third molar is from the lingual angle of the alveolar process, with the exerting pressure on the distal lingual angle of the second molar, shoving the teeth to the buccal—so much so that I have sometimes seen the occlusal surface of the second molar at right angles to the cheek tissues. Where this condition exists, it is a simple process to remove the second molar and allow the developing third molar to erupt almost straight down, and establish contact with the first molar.

" The second classification of malocclusion deals with what are commonly called Class 2 or distocclusion cases. Here we find under-development of the mandibular arch, so that it is perfectly obvious that there is not enough alveolar process to take care of sixteen teeth. If such a case be taken at the ideal period for bone development, and granted that the systemic conditions are favourable, it would be possible to gain sufficient bone development in the mandibular arch to accommodate the first and second molars, and in a small percentage of cases enough development has been gained for the third molars. It has been my observation, however, that in at least 30 per cent. of such cases it would be far better, where the radiograms show a developing third molar without sufficient process to accommodate it, to remove the second molar and permit the third to erupt in the second position.

" As we know, in gaining our bone development in the mandibular



arch with the use of the intermaxillary ligatures, the teeth in the maxillary arch are moved slightly to the distal, and the pressure exerted in an anterior manner in the mandibular arch. For that reason, if the third molars in the maxillary arch have not sufficient space at the time the case is started, it is perfectly obvious that there would not be room enough later when the pressure is of a posterior nature, and the development is merely that of buccal expansion. Therefore in such cases I think it is much better to remove the second molar and allow the third to come into place.

“The reason for so many failures in Class 2 cases has been that we have blindly attempted to retain sixteen normal size teeth that were intended for an individual with normal facial outline and bone development. How many times have we seen cases where the individual had a small narrow face, and the orthodontist in making correction has kept the sixteen perfectly normal teeth and developed the arches to accommodate them. The resulting occlusion may be ideal so far as the teeth and the processes are concerned, but when taken in relationship with the rest of the face it gives an unnatural and ape-like appearance. We should always take into consideration the facial outline and type before drawing our conclusions as to whether it is best to maintain the arch in relationship to the rest of the face, rather than to attempt to establish an ideal where it would draw the arches out of proportion.

“The third classification covers those cases commonly known as Class 3, or mesiocclusion, where we have a normal or overdeveloped mandible, and underdevelopment of the maxillary arch. This type is one of the easiest of all classes to handle and correct, from the standpoint of the orthodontist. As a rule there is less trouble here with impacted third molars on account of the greater development of the mandible, which allows space for them to erupt properly.

“Now in this type of case, where the conditions are as described, and where development is to be gained especially in the maxillary arch, particularly in the anterior portion from canine to canine—for here the maxillary wings have failed to unite with the nasal spine and form a normal maxillary arch—we find less trouble with our third molars than in any other class. But where we find that through our corrective action on the anterior portion of the maxillary arch we are moving the teeth distally on the mandibular arch and bringing about an impaction of the third molar, it is better to remove the second molar and permit the third to erupt normally.

“In considering natural limitations, too many of us are prone to make the mistake of not properly diagnosing the cases of malocclusion that are presented to us, and taking for granted that we can make any change that we desire in the arches, irrespective of the racial type classifications. In other words, we have felt that it was in our power to lengthen the mandible to any length we might desire, and we deemed it entirely possible to put a Racial Type C mandible on a Racial Type A individual—or the same with the maxillary arch, with the corresponding development of the bones of the face. However, such is not the case, for nature has wisely provided a limit beyond which it is impossible, under normal circumstances, to get development. That is why, in certain types



of cases, we find ourselves blocked absolutely in the effort to get mandibular development for the type of chin we deemed desirable. This is known as the law of natural limitations, and the only exceptions to it are where we have an over secretion of the glands which have to do with the development of bony structure, and that is not normal development."

The slides which have been shown of Dr. Potter's cases are of simple cases, and I am convinced, as a result of some experience and changed beliefs, that the extraction of second molars in cases where the first molars are sound and in good health puts a definite stop to lapsing of the treatment of the teeth anterior to the second molar, particularly so in his Racial Type A and Angle Class 1 and Class 2, Division 2. I am also of opinion that the same holds good in his Racial Type B and Angle Class 2, Division 1, if treatment is commenced at the age of 8 or 9 years. If treatment is started later, and the first upper bicuspid is removed in Angle Class 2, Division 1, and Racial Type B, excellent results will be obtained without relapse for some time in some cases and permanently so in others. In like manner the extraction of four bicuspids at an early age of a large number of Racial Type A, Angle Class 2, Division 2, will produce a result which does not lapse. This is one of the most certain non-lapsers in existence—he is our trump card!

A great deal of light will be thrown on this interesting search for a remedy for lapsing of cases by making a study of a few models of cases which have never been treated but have been watched and observed from time to time.

I think we ought to place on record some words of appreciation of the work which has been done by some of our eminent friends abroad, who have tried and are trying to find a remedy for lapsing of treated cases in other ways than by extraction; I refer to the work of Dr. Rogers who was with us this summer. You will remember that he told us he *hoped* his efforts would, in years to come, lead us into a field of success. Gnathostatics and the works of Stanton, Simon and Schwarz have, I believe, a similar hope, but up to the present I do not think any of these gentlemen is prepared to say that if you do this or that you will not have a relapse, but I do believe that, sooner or later, they will tell us that by the adoption of their teaching we shall know which are the teeth most suited for removal, in the cases in which extraction is advisable, and that this or that case needs no extraction. We look forward to the day when these gentlemen will have succeeded thus far. It is impossible in one paper on an important controversial topic to do any more than touch the fringe of the subject; there is a host of side issues which would have to be considered before the subject can be fully embraced and dealt with.

I believe it to be within the bounds of feasibility to boil this subject of treatment of cases of malocclusion down to one of comparative simplicity, and that the adoption of the principles and ideas can be understood, appreciated and practised by a large number of general practitioner orthodontic students with great success; this is the crying need of the general practitioner students of orthodontics to-day in England. We need a middle course, based on a definite plan, for definite reasons, to achieve a definite



result. The indiscriminate extraction of teeth without a plan of treatment based on reasoned ground does as much harm in some cases, and possibly more, than treatment without extraction ending in a relapse. If a few cases have been successful through a chance extraction in the direction of least resistance and the easiest way home, it does not follow that extremist or chance work is worthy of imitation as a general rule of procedure.

#### CONCLUDING REMARKS.

I have tried in this paper to make an effort towards the solution of the lapsing problem, and it can only be considered as a first effort or start. I felt I ought to try to make this effort, as I have done some writing and lots of shouting about lapsing, and you will naturally think and wonder what I am going to do about it, and whether I shall leave it there and run away; as a matter of choice I am prepared to fight it out until some solution is apparent.

The strain of a busy general practice without touching orthodontics is a big one; with orthodontics thrown in it becomes a still greater one. I am convinced that a whole-time devotion of six months' investigation into this subject can produce a simple reasoned presentation of diagnosis and treatment with a Racial Type classification in conjunction with a classification of malocclusion which will embrace most of the cases which come into our hands for treatment, and give us results that we can look on with pride. It can be made simple, comprehensive and effective in procedure. The application of appliance principles and technique at our disposal to-day are ample for the successful carrying out of the work which will be necessary to put our plans into operation. The idea and the policy I have laid before you are worthy of hard work and support, and I trust and hope that the day is not far off when we can face this problem in a very different way from that in which we have faced it in past years.

I have only touched on a very small part of international orthodontic study in the paper. A careful perusal over many years' history will, I am sure, add many more ideas than I have suggested. We will find something in most orthodontic works which will help us, but it is impossible for one who is busy all the time with matters other than actual practice to do the justice to our predecessors' works which they are entitled to.

I am most grateful to you for the honour and opportunity your Hon. Secretary has given me in asking me to appear before you, and I would ask you to accept this paper as a sincere and honest effort of one of your members on a subject which he feels is at the very root of successful orthodontic work in a general practice of dentistry.

#### DISCUSSION.

The PRESIDENT said that Mr. Lockett, as usual, had given a most interesting communication. The question of the lapsing of treated cases had been with the profession since the earliest days in this branch of our work. All had been surprised at the result of extraction, particularly of the six-year-old molars in hospital cases, at the extraordinary results which had been obtained without any treatment. Also they were faced with the difficulty of the impaction of the third molar. It had often been a problem with himself after treating a case to see years later the third molar very badly impacted.



Mr. H. C. VISICK said that Mr. Lockett was to be congratulated on having brought before the Society in such a clear way some rather drastic proposals. It took a man of some courage to suggest extracting teeth in such a manner. To have a generally accepted plan for the treatment of orthodontic cases which every general practitioner could adopt would be a splendid idea, but personally he would like to meet the man who was going to draw it up. He would be very pleased to see the plan when it was on paper. It would have to be only tentative because conditions were changing all the time. Appliances were continually being improved, which made a tremendous difference. In the old days cases could not be treated as they could be to-day; modern materials and appliances were so much stronger and neater. With regard to the extraction of second molars, it seemed to him to be an extraordinary suggestion. He did not know whether he was imagining it, but he had always thought that the second molar was the best of the molar teeth. The first molars were more often carious than the second molars, and the upper wisdom teeth especially were very feeble sort of teeth. They seemed to get caries all over them. It struck him that in many cases a practitioner might extract the second molar and find himself left with a very poor wisdom, the result being that he had practically only the six-year-old molar—one molar—on each side of the jaw. Were wisdom teeth good material? His impression was that they were not. He could not see why the second molar should be interfered with. If overcrowding makes extraction necessary, why not select the first upper premolar, a much better tooth to take out? It is not so important from the masticating point of view and it is nearer the site of overcrowding. If the second molars were extracted, a lot of orthodontic treatment would be necessary to move back the six-year-old molars and the premolars before room could be made for the anterior teeth. Mr. Lockett had mentioned in Angle's Class 2, Division 2 cases that it might be advisable to extract all four premolars. Personally he must say that from his experience he thought that that was absolutely wrong. If one had a Class 2 case of any kind one only wanted out the upper premolars, because the whole lower jaw was too far back in relation to the upper. If one extracted the upper and lower, one had exactly the same relationship, only the jaws were a little smaller. Personally he would say extract the upper premolars, and never extract all four.

Mr. C. S. MORRIS supported Mr. Visick in what he had said about extracting first premolars. He thoroughly disagreed with Mr. Lockett. He thought one would end up with the same relation of the jaws as one started with—one pace to the rear. Another thing he would like to say with regard to extracting upper premolars was that if one found oneself too short, with the upper incisors not back against the second premolars, and one wanted to shorten the lower arch, one had only to take out the lower central and it worked like a charm. He considered Mr. Lockett's paper was an extraordinarily good contribution to the subject of relapsing. Personally he had never thought of taking out a second molar. Mr. Lockett had certainly given the members a tremendous amount to think about, and practitioners might be on the track of stabilising some of their disastrous cases instead of having to go through all the trials that they did when they saw the cases five, six or seven years after they had been finished, when they had looked to be extremely attractive cases. He would like to hear what other members had to say about such a novel proceeding as that put forward by Mr. Lockett.

Mr. H. G. WATKINS said a great deal depended on the amount of overbite. If there was too much overbite of the incisors and one removed some of the occlusal surfaces one would probably make the overbite worse. If there was not much overbite then one could get the upper incisors back by extracting the first premolars. With regard to lapses, when there was an anterior crowding of teeth, it



was most likely caused by the balance of the forces of the cheeks and the lips being opposed to the tongue. If the tongue was abnormally small, and one did not reduce the number of bricks in the arch but just got them to normal occlusion and after a time removed all the appliances, something would happen if the lips were going to press more strongly outside than inside. If one had already removed two or four teeth there was more chance of the teeth in each arch remaining in a state of equilibrium between the pressure of a small tongue and the cheeks outside.

Mr. J. H. BADCOCK said he confessed that when he had heard Mr. Lockett suggest the extraction of four premolars in Class 2, Division 2, he thought it had been a slip of the tongue, and he was very desirous of hearing Mr. Lockett's explanation in defence of that proceeding. He had thought that Mr. Lockett had meant Class 1. It seemed to him that it was a proposition which it was rather difficult to defend. With regard to the extraction of second molars, it seemed to him that there, as in other cases, one had to be guided by circumstances. He took it that one would first ascertain by means of radiograms whether the wisdom teeth were of normal size and likely to come into normal position. If they were not, it seemed to him that the second molar, being, as Mr. Visick had said, an exceedingly valuable tooth, should be retained, and should only be extracted when absolutely necessary. He had had a case a little while ago where the second molars were impacted against the first molars, and the wisdom teeth were impacted against the second molars. In his anxiety to save the second molar he extracted the unerupted third molars, hoping that the second molars would fall back a little, and so come into proper position. They had not done so, and had shown no sign of doing so. They still remained impacted, and he thought he would have done better in that case had he extracted the second molars instead of the third, and so avoided a very difficult operation, and possibly achieved a better result.

Mr. W. A. BULLEID said there was one aspect of Mr. Lockett's paper to which he desired to draw attention. Dr. Potter's classification was based on what he was pleased to call racial types. Personally it seemed to him that that was a very dangerous and a very difficult way of classifying either people or cases. In any case it certainly was not of universal application. Dr. Potter was an American, and in America there was a mixture of different races. America was a melting-pot of races; there was there the Slavonic element, the Italian element, and the Scandinavian element. Those were more or less distinct races, and in the United States they blended and there were mixtures of them. Therefore there might be some grounds for Dr. Potter classifying American people according to types or mixtures of types; but, for the life of him, he could not see that such a classification could be of any value in a country like this, for, although we were an enormously mixed race, the mixture had gone on for so long that any real classification according to racial types was a practical impossibility in this country. As a matter of fact, in his own mind he regarded with a good deal of scepticism the question of racial types and their mixtures. He was inclined to think himself that relapses occurred in cases where the etiology factor of malocclusion was an hereditary one, and that in cases where the deformity was due to a local cause one did not get any relapse. There was one thing about Mr. Lockett: he was a thoroughgoing pessimist! Was the reputation of orthodontics in this country—that most cases relapsed—true? Personally he did not think it was. A great number relapsed, but the majority did not; and the drastic method which Mr. Lockett suggested as one of universal application was, in his own opinion, one to be condemned out and out.

Mr. H. CHAPMAN remarked that the question of extraction was one of the utmost importance in the work of a practitioner. He agreed with previous speakers that if it could be applied in the right place



at the right time it would help retention very considerably, but the difficulty seemed to be to decide which was the right place and what was the right time in which to do such things. Previous speakers had said that if there was to be a general rule it should be the first premolars; and he agreed with that for reasons which had already been given, namely, that the first premolar came as near the centre of the two halves—or each half, he should say—of the arch; that was to say, it was about the centre of where the errors were. Therefore he did not think a better tooth could be chosen for removal, if there was any removal at all. He desired to ask Mr. Lockett if the members were to assume that if the second molars were to be removed, were they to delay their treatment until 12 years of age or approximately to the time when those teeth erupted? Personally he had advocated for a long time that treatment should be early. He had not heard anything in the paper which would convince him that that was wrong, and if that was so it seemed to him that it must also be wrong to remove the second molars, apart from the reasons which had already been stated. In his own experience there were certain cases in which the removal of premolars was absolutely indicated. He had attempted to retain all the teeth and, having failed, had had to fall back upon the extraction of two upper premolars; and it seemed to him that there were certain types of cases in which that was the correct treatment. Again, cases were seen in which lower incisors had been removed, and he had one at present. Two lower incisors had been removed, and that case had given him more anxiety than any other. If he were to take off the appliances now the result would be that the arch would contract even more; the two incisors which were left would crowd still further. He also remembered showing a case before the Society where he had removed a lower central in order to let in a lateral, and that case had collapsed too. Therefore he did feel that experience of a large number of cases was wanted in order to learn how they behaved when teeth were removed. Mr. Lockett had ventilated a very important matter. What was required was that a number of cases should be brought before the Society showing the result in the different circumstances so that the members could gain experience in that way. He did not think anything was to be gained by stereotyped treatment such as Mr. Lockett suggested. It seemed to him that each case or type of case was a law unto itself.

Mr. A. C. LOCKETT, in reply, said he desired to repeat what he had stated in the paper, namely, that the subject was too big a one to be covered by one address in one evening. He also desired to emphasise the point that the extraction of the second molar was Dr. Potter's idea and not his own. Dr. Potter had taken up a definite line of work on those lines, and proposed to carry it on for the simple reason that he was convinced—and on that matter he (Mr. Lockett) was in agreement with him—that the lapsing period started on the arrival of the second molar. If these cases were retained during that period, and a little beyond it, then the lapsing period would commence, in certain types of cases, on the arrival of the third after the removal of the retainers. Dr. Potter's idea was that it was much better to go right to the root of the matter—that if it were possible, to remove the third molar—then there would not be a tendency to lapse when the second molar started to erupt. The idea of taking out a second molar, which was about the soundest tooth in the denture as a general rule, was a terrible thought, even where there was a tendency to caries. He had not advocated it himself, except to the extent of searching for some remedy. If anyone could suggest any other means whereby the problem could be solved, other than by extraction, he would be only too pleased. From experience he did know that there were certain types of cases which did not lapse under any circumstances whatever, and that one could treat them without any extraction, but they were very few and far between. There were less of them



in England than anywhere else as far as he knew. Mr. Visick had stated that it was a drastic idea, and he agreed. With regard to the plan of classification, he knew it would be very difficult to formulate a plan or a classification of certain types of cases which would in every event prove successful, but even as a tentative and experimental beginning it might prove useful. The great difficulty about our work was that one had to spend the best part of one's life in either proving or disproving something. Such an experiment would take three or four years before one could begin to call it the commencement of an experiment. In reply to Mr. Visick he had also stated in his paper that he believed there were many cases where the first bicuspid, if extraction were resorted to, was preferable. Some members had been horrified at what he had said about extracting four bicuspids in Class 2, Division 2 cases. He had the greatest respect for the opinion of those members, but he had seen many cases where those four bicuspids had been taken out in Class 2, Division 2 cases with perfect results, as far as the occlusion of the remaining teeth was concerned, but in these cases there was not an excessive overbite. There was a tremendous amount of room for thought in regard to the matter, and he realised it was a serious question to put before such a distinguished Society, but to those of us interested in permanent results, well worthy of our careful consideration. He was not sure that he quite agreed with Mr. Bulleid that the classification of types of different people and races was dangerous and impossible. Mr. Bulleid had described him as a thoroughgoing pessimist. On the contrary, he was a most cheerful person, as a rule, in all matters which he came up against. He did not know that any pessimist would tackle this problem as he had done if he were not convinced that the matter could be put right.



## THE RESPONSIBILITY OF THE OPERATOR FOR RELAPSES AFTER ORTHODONTIC TREATMENT EXECUTED IN FULL ACCORD WITH THE DIRECTIONS OF LEADING AUTHORITIES.\*

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MOST orthodontists who have been engaged in active practice for any considerable number of years, and who have been in the habit of studying the final results of their treatments, must have arrived at the disheartening conclusion that in many cases these results are very different from what they expected. On the other hand, we have a very simple theory as a basis for our treatments. In our periodicals a large amount of space has been allotted to case reports, in which the descriptive accounts are limited to a discussion of a suitable tooth-moving appliance, and an exhibition of the immediate result. This shows that in the minds of at least a considerable number of practitioners the art of correction of malocclusion consists of mechanical problems.

There are also writers who claim that the final conditions of treated cases are proofs that the manipulations, to which the cases have been subjected, correspond with what the individual case demanded. Some of these statements will be discussed later, but I will at present only make the remark that their assertions have a tendency to retain orthodontics in the combination of mechanical art and natural philosophy, in which this art still remains, even if it must be admitted that promising signs of a new tendency are by no means wanting.

The chief difficulty appears to me to be this, that the practical treatment and the mechanical technique have, so to say, bolted off, while the scientific foundation, the knowledge of the real effects of mechanical or other kinds of treatment, is very limited. And as long as this condition remains we must expect that our manipulations will to some extent fail to secure the results we have aimed at. Also, there are certain risks that trying treatments will be performed with the object of obtaining a final result, which may have ensued without any artificial disturbance whatever.

Both these possibilities being extremely undesirable, it ought to be an important task to investigate the possibility of anticipating the real effect of the treatment.

Having examined a number of my cases many years after the removal of the retainers, I have collected some material, from which it seems to me to be possible to draw some conclusions as to which malocclusions may and which may not be successfully treated. A very important question in this connection and deserving to be fully discussed is this: to what extent is the operator responsible for the non-attainment of results after a treatment executed in full accord with the assertions published in official text books or in such as have been more universally adopted as being reliable?

\* *Transactions of British Society for the Study of Orthodontics*, Dec., 1927.



At the present time there are probably very few orthodontists with any considerable experience who do not at times resort to extraction of teeth. But on the other hand we find many indications that the announcement of Angle concerning the normally occluding denture as an attainable objective still has a very powerful influence. We find several very definite declarations in this direction in the proceedings of the First International Orthodontic Congress, and those who examined the models exhibited at that Congress will no doubt have a vivid recollection of the way in which the theory in question still governs orthodontic therapy.

But anyone who gives time to carefully study our literature will find certain suggestions as to treatment, indicating a presentiment of an unavoidable retreat. These modifications in the original methods imply a tacit admission that permanent results are not always to be expected after the attainment of normal occlusion. At least five of this kind have been given ; they are :

- (1) The necessity of bodily moving appliances.
- (2) So-called physiological tooth movement.
- (3) Early treatment.
- (4) Extraction of second or third molars.
- (5) Muscle exercises.

Before setting down a rule for therapeutic activity we ought first to present evidence of its being reliable. It appears to me that those authors who have given the above-mentioned directions have not produced sufficient clinical data of a character to prove the validity of their claims.

(1) *Bodily Moving Appliances*.—Having in a former paper given a rather detailed account regarding the clinical evidence as to the permanence of the results obtained after the use of bodily moving appliances, it is unnecessary to occupy ourselves much more with this question at present. I have not been able to find any new data which confirm this method's supposed capability to effect a permanent change of the size and form of the regions beyond the apical plane. On the other hand, an observant student of current literature will find passages indicating the inefficiency of the method as regards these effects.

For instance, in the year 1924 Hawley<sup>1</sup> published thirty cases treated with the ribbon arch, and, as may be seen from the illustrations, the temporary result was very gratifying. But shortly after we find Hawley an enthusiastic admirer of the Simon method of diagnostics. It appears to me that this would hardly have happened unless some of the published cases had relapsed. And another practitioner with an extensive experience in the operating of bodily moving appliances, Young,<sup>2</sup> positively states that the basal portion of the jaws cannot be changed by tooth-moving appliances.

"*Physiological* " *Orthodontics*.—Several authors have stated that we have at our disposal a method, working more slowly, without interruption, and with a minimum of functional disturbance. As distinct from other methods, this one should be called physiological. Mershon has developed this method to a high degree of perfection, and he is of the opinion that he has succeeded in getting more permanent results than was possible with the older appliances.<sup>3</sup>



A very extensive collection of closely controlled clinical data is necessary to prove this assertion, but has not yet been published.

*Early Treatment.*—Any operator with an extensive experience in the orthodontic treatment of children of different ages will certainly admit that the very early treatment is more exacting to the operator than, for instance, the eleventh or twelfth year. One reason, and probably the chief one, to choose the more exacting period, is this, that the relapse of cases has been attributed to the fact that treatment had been postponed to a comparatively unfavourable age. The cases (Figs. 1-2 and 3-4) are instances of rather rapid treatment in somewhat complicated cases, the time of active treatment, including the time taken for placing the appliances in position, being respectively 7 and 8 months. No special technical reasons for an earlier treatment seem to me apparent in these cases.

The earlier age has been chosen on the assumption that the facility of “stimulating” growth is in an inverse proportion to the age of the patient. The earlier the treatment is started the greater is the effect supposed to be. This assumption is probably correct as regards treatment for growth disturbances of an endocrine character. But if we except the acromegalous deformity we have as yet not succeeded to procure evidence that malocclusions of the teeth are endocrine disturbances, and, moreover, our methods of treatment are purely mechanical and functional.

Some authors have given orthodontics the name dental or dento-facial orthopædia. This term is suggestive of a similarity between our specialty and orthopædic surgery and mechanotherapy. But in reality there are considerable differences between both these arts. The art of orthopædic surgery has for its essential objective the treatment of the results of tuberculous and other pathological changes in the tissues. The objective of orthodontics has been to change the mass of bone and shift its position, but as far as we can see the bone itself has not undergone any pathological change. It is only in cases of distoclusion and possibly also in a limited percentage of mesiocclusions that there seems to be some affinity with orthopædics proper, as perhaps these anomalies are connected with an abnormal functioning of the mandibular joint. I will later discuss the evidence that has been published to prove the advantage of early treatment.

*Extraction of Second or Third Molars.*—Barnes<sup>4</sup> is one of the very few orthodontists who have taken the trouble to examine and publish the final results of their treatments. His examinations have clearly demonstrated the risks of relapses in cases of crowded dentures. It is his opinion that a very frequent cause of this is the pressure of the erupting third molars, the pressure being transmitted from the second to the first molars, bicuspid and anterior teeth. Therefore he recommends the removal of the second or third molar.

This hypothesis seems to me very improbable. If really the third molar should exert any considerable force, we would expect that the teeth anterior to this tooth, being locked in occlusion, ought to be able to present a very effective resistance, and that as a result of this the bony tissue posterior to the third molars would be resorbed. The investigations concerning the growth of the mandible have made clear that the forward growth is effected



by means of a resorption of bone at the anterior border of the ramus and the region immediately posterior to and in the same level as the crown of the third molar. Aichel,<sup>5</sup> who has given much attention to this problem, is of the opinion that no evidence whatever has been presented to prove that the teeth travel horizontally in an anterior direction. He reminds us of the fact that the septa alveolaria consist of strongly built bone, while the alveolar walls of the developing tooth bulbs are exceedingly thin and porous. It seems to him difficult to assume that these thin shells of bone should present a resistance strong enough to cause the resorption to occur in the septa alveolaria. The case (Fig. 5-6-7) shows a relapse in the anterior region of the arch reminding somewhat of some of Barnes' cases, although in this case a bicuspid had been extracted. The explanation is in my opinion simply this: the anterior section of the mandibular base has been too small even for the reduced number of teeth.

*Muscle Exercises.*—Another theory that has been advanced to explain the relapse of cases is this, that the functioning of certain groups of muscles has been subnormal. As a suitable supplemental treatment it has been suggested to artificially stimulate those muscles, whose subnormal tonicity is supposed to have been an active factor in the production of the malocclusion.

I would not like to be understood as denying the value of muscle exercises in the treatment of certain varieties of malocclusion. It seems to me highly probable that Rogers<sup>6</sup> could have effected the result shown in Fig. 8-9 without the use of any appliances, only through the medium of his muscle exercises. But when he declares that, by help of muscle exercises, it is possible to effect an increase in the width of the maxillary base itself, it is hard for me to follow him. The material he has hitherto published seems to me insufficient. Moreover, many observations have been made which are incompatible with this functional hypothesis. Space does not allow me to go into details, but I will just mention a few: for example, the apparently normal size of the maxillary and mandibular bases in cases of congenital absence of teeth and in cases of ankylosis, and the common occurrence of a crowding of the teeth in one jaw and a normal size of the base in the other in the same individual. And if we find instances of a subnormal size of the bases in cases in which we are able to conclude that the function has been active, it seems to me hard to understand how an artificially stimulated function will be able to effect what the natural function evidently would not attain.

We have, as far as I can see, not yet collected a sufficient number of clinical data to be able to prove that bodily moving appliances, so-called physiological orthodontics, early treatment or muscle exercises are capable of effecting such a change in the regions beyond the apical planes that an artificially attained normal occlusion will become permanent in every case. However, it seems to me to be not at all improbable that if a practitioner follows the rule of treating every malocclusion he detects at an early stage and with normal occlusion as his objective, then the average final results will seem to justify these principles of treatment. But even if it seems so, we ought not to be content with this. We ought to try to find out the clearly demonstrable results of orthodontic manipulations, so that we do not perchance treat



cases which would have developed into normal conditions without any interference whatever.

*Growth Sites and Experimentally Demonstrated Effects of Orthodontic Tooth Movement.*—The increase in bone tissue, which characterises the growth of the jaws, takes place according to Brash<sup>7</sup> partly in the sutures, partly on certain surfaces through periosteal apposition, and partly immediately underneath the roots of the teeth. The investigations of Sandstedt, Oppenheim and Leroy Johnson<sup>8</sup> demonstrated certain changes in the immediate surroundings of the teeth. There is no evidence of any growth in the jaw bones analogous to what Brash has shown to occur in periosteal and suture growth. Dewey has been able to produce sutural growth in the sutura mediana palatina in a dog after rapid opening of the suture by means of an orthodontic appliance. But a successful opening of the suture in the molar region in man must also imply the overcoming of an apparently very strong resistance in the region close to the malo-maxillary suture. It must be a very uncertain undertaking to use orthodontic force on the teeth alone and through any such method attempt to effect the harmonious interaction of apposition and resorption, which occurs in the normal growth of the jaws.

It appears to me to be very improbable that an harmonious growth of this character could be attained by means of an increased masticating function. Among other reasons, which have been published elsewhere, I would suggest the following: if it is a certain amount of function that effects that growth of the jaws, which renders the final eruption of the teeth into normal occlusion possible, then it seems to me that a supernormal but in other respects similar function ought to effect an abnormal increase in the ordinary growth sites of the jaws, and we would in such cases expect to find amongst other peculiarities abnormal spaces between the incisors and an abnormal vertical development of the face. Those changes which have been observed in cases of excessive masticating function, as, for example, in the Eskimos, are of a very different character.

Let us now assume that the professional men who first became interested in malocclusions were taking into consideration whether it might be possible to correct these disorders; that, suspecting that the disorders in question might be results of growth disturbances, and being convinced that before treating a disorder you must first know something about it, they began to study the growth of the jaws instead of just inventing and placing in position certain machinery for moving the teeth. If we assume that they had advanced so far in these studies that Brash's results had been reached, we can hardly imagine that they would think it possible by means of the orthodontic methods at our disposal to attain what is in our own time the most common objective of our treatment in cases of jaw deformities.

A careful study of the final results of the orthodontic treatment of cases will disclose a vast difference between what is stated as occurring and what in reality does occur. This fact is most clearly revealed in our literature as a result of the incomplete character of the clinical data. Final results of quite a number of types of malocclusion have not yet been published.



In this connection I will relate a rather peculiar experience I had during my last visit to the United States. I had read a paper, in which I had described some cases of jaw deformities exhibiting rather remarkable growth conditions. During the discussion following the paper a gentleman complimented me on what he was pleased to call my courage to exhibit my failures. That this can be said and applauded at a scientific meeting shows how far we still are from having obtained the true scientific view on the object of our studies.

If to a certain extent our results are not in accord with our hypothesis, it is evidently of great importance to be able to determine the characteristics of the malocclusions with an unfavourable prognosis. In the following an attempt will be made to give an account of the peculiarities of certain types of malocclusions, using as a basis some cases from actual practice. As the scope of this subject is rather extensive, it will be advisable to somewhat restrict the problem to be discussed. I have therefore purposely omitted several types of malocclusion, among them the greater number of those which seem to be the results of habits.

The types of malocclusion may conveniently be divided into two classes: (1) malocclusions in which the size of the region beyond the apical plane is in harmony with the coronal curve, when the full complement of the teeth is in normal approximal contact; (2) those in which this harmony does not exist.

In cases belonging to the former group the basal region is normal. There are several different varieties and their characteristics are best described by help of cases from practice.

The basal region was apparently normal in case Fig. 10, and the malocclusion restricted to the left side. As it was necessary to move the molars backwards in both jaws, the application of force and the economising with the anchorage was rather difficult, and we find a small amount of over-expansion in the anterior region, as is clearly shown in Fig. 12, from an impression taken four years after the removal of the retainers. It seems probable that the malocclusion was a result of early loss of deciduous teeth. Concerning the prognosis for cases of this kind not much need be said, as the problem is mostly one of a sufficiently early treatment and of technical ability.

As has just been mentioned, Brash demonstrated a steady addition of new bone under the roots of the teeth, corresponding with the growth in the other portions of the face. But we are sometimes able to discover early pathological disturbances in the immediate surroundings of individual teeth. In such cases it may happen that at the point in question the bone growth ceases or is at least very slight. As the general vertical growth proceeds, the occlusal level of the normal section of the dental arch rises, but the tooth or teeth in the diseased section lag behind. After a few years these last-mentioned teeth seem to have crept into the jaw. Fig. 13 is a case of this kind, Fig. 14 with a lower retainer in position, Fig. 15 is five years after the removal of the retainers. As we have not yet discovered the nature of the pathological changes causing this local disturbance, nor the degree of probability with which it will be followed by a retarded vertical growth, it would not be fair to let the operator be responsible in a case in which the result of a carefully conducted orthodontic



treatment has become more or less disturbed by pathologic changes. Disappointments of this kind may be expected when the pulp has been removed before the apices of the roots are fully formed, and generally occur in cases of early and extensive caries in first molars and traumatic injuries of upper centrals.

*Distoclusion.*—In a paper published in 1925 I have given some reasons for considering distoclusion as a local momentum of malocclusion. A very strong argument was found through the discovery of a case of monochorial twins, one of which was a case of neutroclusion and the other a case of distoclusion. Also the investigations of Friel<sup>9</sup> and Schwartz<sup>10</sup> concerning the details of the eruption of the first molars into their correct mesio-distal relations are of a character to support this assumption. According to my statistics of 1923, it is possible to successfully correct distoclusion in about 83 per cent., to improve the condition in 12 per cent. In 5 per cent. there was no improvement whatever. The data I have collected since then have not materially changed this percentage.

Fig. 16 is a case of bilateral distoclusion. There was also a probably local growth disturbance in the region of the left upper incisors and cuspid. The distoclusion was corrected without difficulty and was easy to retain. But the region around the left incisors and cuspid gave me a good deal of trouble, and it became necessary to re-treat this region, as the teeth would not accompany the general vertical growth of the other portions of the alveolar process. Although the condition shown in Fig. 17 is good, I will not be surprised if further difficulties are in store, depending on whether the vertical growth of the face has attained its completion or not.

The characteristics of distoclusion I have mentioned in the foregoing seem to confirm the hypothesis that this momentum is the result of a functional feebleness, and to the best of my knowledge it was Sim Wallace who was the first to advance this idea. I have, however, never been able to find that distoclusion is necessarily accompanied by a subdevelopment of the body of the mandible. But if the nature of distoclusion is what I have stated, then it must be considered as being in keeping with science and experience to treat this anomaly by moving the lower arch in an anterior direction. Should the attempt prove unsuccessful, we have no right to declare that any mistake has been made, any more than when an established method of treating a disease fails to effect a cure.

Strange to say, we occasionally find the suggestion to treat distoclusion with help of the extraction of the first maxillary bicuspid. The objective is then to leave the distal position of the lower arch unchanged and restrict the movement to the six anterior upper teeth. After a number of experiments with this technique in cases in which for other reasons the routine method could not be used, I have arrived at the following conclusion: it is suitable only in those cases in which the region above the upper apical plane is too small, or, expressed in the terminology of Franke, the height of the apical arch is too small. In other words, the *apices* of the upper incisors and cuspids are not (or very little) too far forward in relation to the lower teeth. Another drawback with this method is caused by the frequently occurring deep



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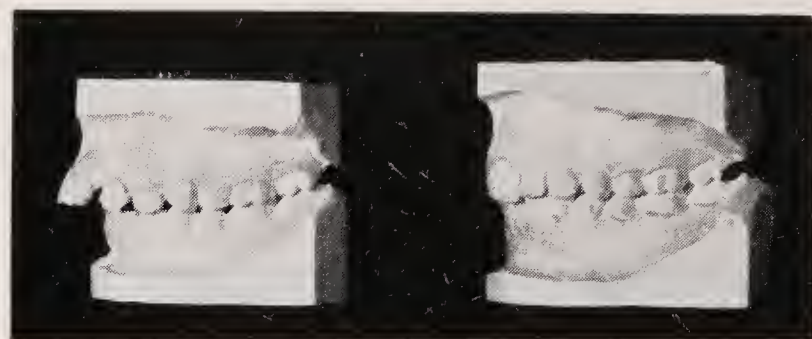
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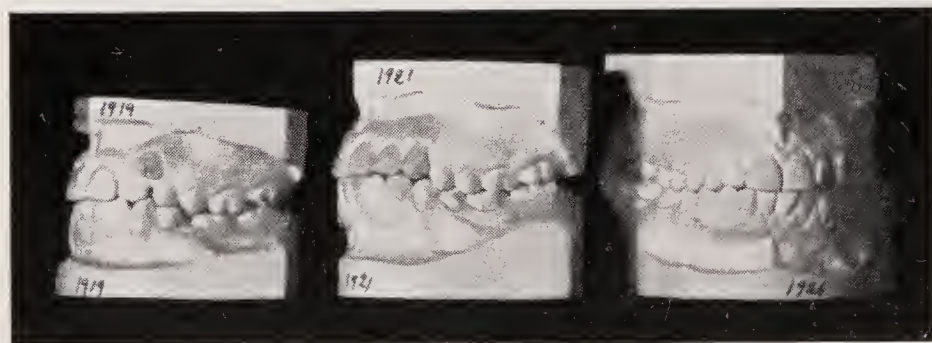
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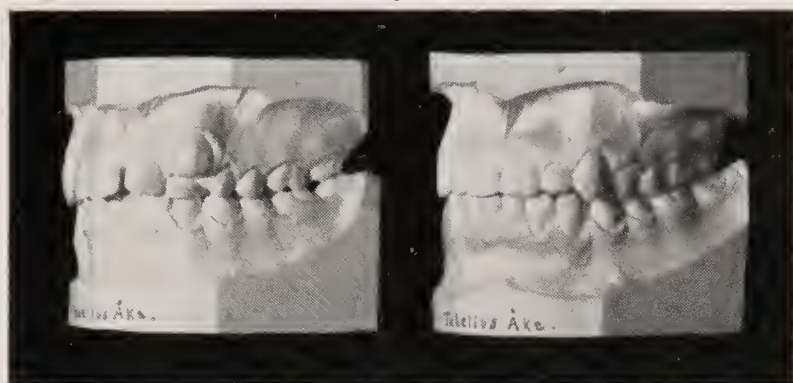
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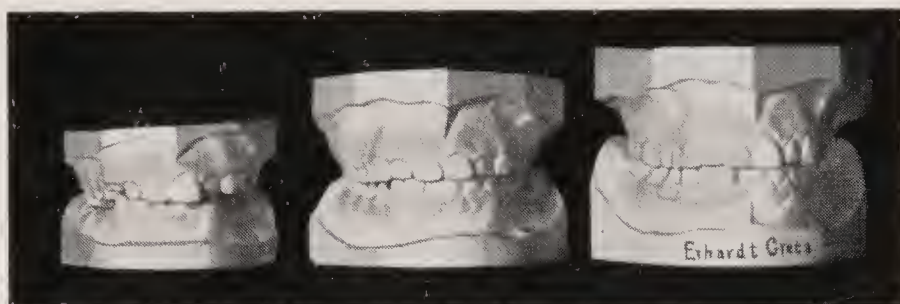


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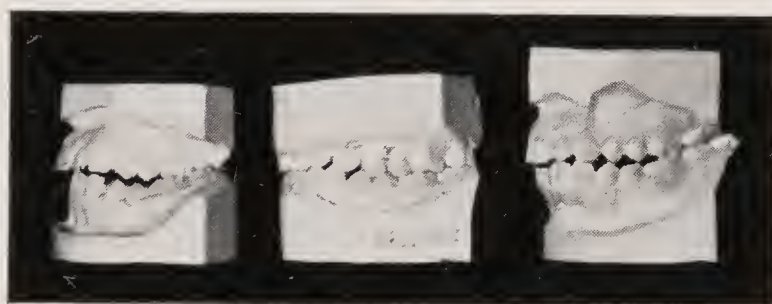
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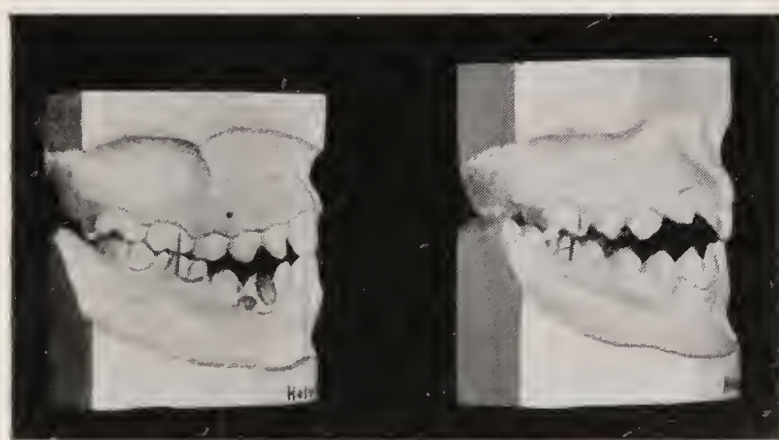


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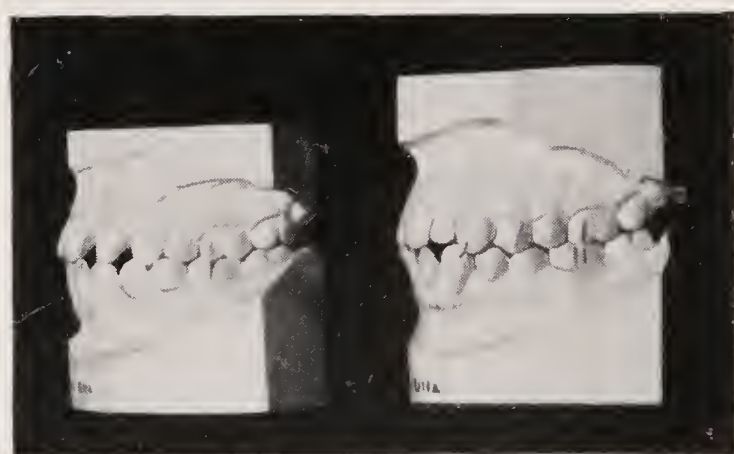
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overbite. The distal position of the lower arch is to some extent compensated by the defective maxillary base, and this underdevelopment is manifest in some form of crowding in the upper arch. Extraction is justified in these cases if besides the distocclusion some form of apical crowding is present in the maxillæ. An interesting case of this character has been published by Weinberger<sup>12</sup>.

The large percentage of successful treatments of distocclusion I have on record, which is also confirmed by the comparatively large number of cases published by others, ought to have this result, that omission to attempt to move the lower arch in an anterior direction can hardly be excused, unless the distocclusion is accompanied by the above-mentioned momentum of crowding. There is, however, a small number of cases, according to my statistics about 5 per cent., in which the ordinary treatment with intermaxillary force, "Baker anchorage," does not succeed at all, and 12 per cent. in which it only partially succeeds.

Rogers<sup>6</sup> has published a case concerning which he states that the usual methods of treatment had been used for several years without result. By means of his muscle exercises he succeeded to train the patient to a correct occlusion in a remarkably short time. But even if cases be found, in which not even the Rogers method will produce the desired effect, we are not entitled to charge the operator with the failure. It is not the fault of the operator, but, as it seems, a rather uncommon peculiarity in the individual case. However, before starting treatment the operator ought for safety's sake to call the patient's attention to the fact that in a small percentage of distocclusion cases the prognosis is unfavourable.

The types of malocclusion we have just discussed are characterised by apical bases of sizes harmonising with the coronal curves. In one of them the permanent result of the orthodontic treatment was disturbed by apparently pathological conditions above some individual tooth or teeth. In the malocclusions, the prognosis of which we are now going to discuss, the growth disturbances are seemingly located in the normal growth sites of the jaws. The result of these disturbances is manifest in a disharmony between the coronal curve and the region beyond the apical planes. These cases are real jaw deformities, distinguished by a super or a subnormal activity in the growth sites.

But when, for instance, we speak of a supernormal activity in any of the growth sites, we must not forget that this expression is subjective, and that what *appears* to be a supernormal activity perhaps in reality is not at all a manifestation of a greater specific rapidity of the bone growth, but is only rapid in proportion to the growth rate in other sites. There is also another possible explanation. We may be allowed to suggest the hypothesis that certain jaw deformities are not due to any abnormal rate of growth, but are the results of, let us say, an idiovariation or a mixo-variation, with the deformity present in the embryo.

Keith and Campion<sup>11</sup> discovered a certain parallelism between the normal and the acromegalic growth of the face. It is not difficult to find a certain correspondence as regards the normal growth sites, which have been discovered by Brash, and such points as would seem to be involved in the genesis of the jaw



deformities. According to this author the jaws grow by means of alveolar growth, suture growth and periosteal apposition and resorption.

A point of view of very great importance as to the most suitable age for orthodontic treatment is this. If the types of malocclusion we are now discussing are manifestations of a supernormal or a subnormal activity in the growth sites, then we must *a priori* expect that this tendency to develop an abnormal form of the jaws, resulting in malocclusion, will be apparent during the whole growth period of the jaws, exactly as in the case Fig. 13-15 the pathological process prevented the tooth involved from following the rest of the teeth during the general alveolar growth.

Let us assume that we have successfully treated a jaw deformity at an early age. We have no doubt accomplished something, but if that something cannot be looked upon as a pathological condition that has been cured or has in some way been transformed into a normal condition, then it seems to me that we may expect a relapse. And then we ought to consider heredity as a possible etiological factor.

The common occurrence in certain families of bimaxillary crowding, excessive alveolar growth in the upper incisal region, mesiocclusion or opisthognathism, suggests that these momenta of malocclusion may be regarded as hereditary variations. An hereditary variation is not a result of the surrounding conditions, is consequently not due to a pathological process that has arisen from external effects, is not the result of dietetic disturbances, and is not caused by abnormal function.

As to the orthodontic treatment of cases like these, we may suggest the following simile. Let us assume that from reasons similar to those which often influenced the late Dr. C. S. Case, we attempted to change a case of normal occlusion to something else, as for example by enlarging the arch by means of expansion and insertion of artificial teeth, or we might reduce the arch through extraction and a following "contraction." It seems probable that the changed position of the teeth could not be maintained without some form of permanent retainer, because the original condition was the only one the anatomical and physiological *milieu* would tolerate.

We may find that in certain slight cases of, for instance, bimaxillary crowding, it is impossible to get permanent results without some form of permanent retention. It will accordingly be our duty to consider whether the relapse is not a result of a similar cause, viz. that we have made an artificial encroachment upon the most natural balance between the apical and the coronal curve for the individual in question. We will then have to reconsider the indications for our treatments and will perhaps discover that they will have to undergo a radical change.

If an extensive investigation of cases of bimaxillary crowding at different ages should prove that perhaps 80 per cent. were self-correcting, and a similar examination of corrected cases had shown that 20 per cent. could not be retained without permanent retention, then we must admit that it is rational to suspect that the 80 per cent. successfully treated cases correspond with the 80 per cent. self-corrected ones. This would mean that the treatment had been superfluous.



*Bimaxillary Crowding.*—We will now discuss a few reports of cases of jaw deformities, and we will begin with the bimaxillary crowdings, a variety of malocclusion that has caused me great disappointment. Malocclusions of this kind are rather common. Since the year 1900, when Angle published the sixth edition of his book—his method of treating them without extraction—the great majority of writers having anything to say about these cases have recommended the same plan. However, at the time, or 1900, Angle himself was by no means so decided as to the universal retention of the full complement of teeth as he has become afterwards, and as he still is in his more recent declarations. In the textbook in question he describes a case (Figs. 186 and 187) concerning which he says (page 199): “It will be readily seen from a study of this case that the upper jaw was naturally diminutive in size, giving marked labial inclination to all of the anterior teeth, even in their crowded condition, and that moved into correct alignment their protrusion would be exaggerated and the result impracticable.”

Angle's command that the whole complement of teeth be retained seems to have been very generally obeyed. Several statements (as for instance by Kelsey<sup>12</sup>) have been made that it is by no means unimportant at which age the treatment has been performed, and there is a pretty general conviction that if an expansion is performed at a very early age, say 5 to 7 years, then the result will be permanent. I have previously criticised the theoretical basis on which this method of treatment is founded.

The clinical evidence that has been published is very meagre. When, in 1923, I published some results of my orthodontic experiments, I indulged a modest expectation that the Angle School by means of a crushing evidence would give definite proof that expansion of crowded dentures of this type was a method giving permanent results. This has not been done. I have since that year searched through, I suppose, most of the existing literature on this subject, but have succeeded to find only four cases with permanent results. Two of these have been published by Chapman (*Intern. Journ. of Orthod.*, 1923, p. 407; 1924, p. 287) and one by Baker (1923, p. 203). This last case is evidently considered as being very remarkable, as it was re-published later. We have also a case by Kelsey (*Intern. Journ. of Orthod.*, 1923, p. 532). Barnes, who has probably shown the most reliable material exhibiting results as they appear many years after the removal of the retainers, has published six cases with partial relapses (same journal, 1923, p. 721).

Fig. 18 is a case of bimaxillary crowding, which was treated at the age of        years. A remarkable amount of abrasion seems to me to indicate that the intensity of the masticating function is somewhat more intense than is now generally to be found. Fig. 19 is the same case after treatment and Fig. 20 shows the condition six years later. When we find in a case like this that neither the stress during mastication nor the early treatment could secure the desired result, we are inclined to attribute permanent results, as in Chapman's cases, to something else than the orthodontic treatment.

The case illustrated in Fig. 21 is a malocclusion (Fig. 22) one year after the removal of the retainers. Quite recently, in October,



1927, two years after the removal of the retainers, it was re-examined, and as far as could be seen the occlusion was identical with Fig. 22. In my opinion the satisfactory result is a consequence of the fact that the "momenta of malocclusion" in this case are local, that is to say are dislocations resulting from early loss of deciduous teeth, distoclusion and secondary crowding of the upper incisors. This is consequently not a case of bimaxillary crowding and is not characterised by a subdevelopment of the basal portions of the jaws. It is not a "jaw deformity" but a conglomerate of local displacements. The treatment has accordingly been limited to a changing of the positions of the teeth on normal bases.

*Deficient Alveolar Growth.*—The case illustrated in Fig. 23 was characterised by an abnormal narrow upper arch and infra-occlusion in the left bicuspid region. It was corrected by means of an extensive use of vertical intermaxillary force (Fig. 24). Seven years later it was examined (Fig. 25). The infra-occlusion has returned, probably on account of a deficient alveolar growth in the same region. It seems probable that it is to be explained in this way: since the time when the correction was completed the vertical growth of the face has gone on, without any compensating growth at the originally deficient growth sites.

*Excessive Alveolar Growth.*—In accordance with what has now for a long time been accepted teaching, the case (Fig. 26) was treated at an early age, and normal occlusion was readily attained. A year or so after the removal of the retainers the condition was re-examined. The mesio-distal relations were correct, distoclusion being a mere local affair and as such amenable to a local treatment, but the deep overbite, the lengthening of the incisors, and the spacing had returned. This anomaly is of a common occurrence in the patient's family. If the original condition, that is, *minus* the distoclusion, is to be looked upon as a manifestation of a— from the viewpoint of "normality"—disharmonious alveolar growth, then we must expect to find that the "disharmony" will have a tendency to reappear during all the time throughout which the vertical growth of the face is going on.

*Mesioclusion.*—The most prominent opinion concerning the nature of mesioclusion is this, that if it is treated at a very early age, say at 5 or 6 years, the object of the treatment will be attained, and even pronounced types of "progenie" will be prevented from developing. A very typical sample of this simplification of the problem was presented in an advertisement in a leading dental journal in the year 1921, under the heading "A Little Study of Malocclusion." It was clearly proclaimed in the text accompanying the illustration that if the patient to the right had been treated at the same age as had been the case with the one to the left, the tremendous deformity would never have developed.

I have on several occasions published material with the object of proving that the treatment that has been founded on this theory is sometimes inefficient, and that in these cases a temporarily attained "normal occlusion" is incapable of preventing the deformity from reappearing. The results of the studies of the growth sites of the mandible, begun by Hunter and Humphries and completed by Brash, seem to me to fully confirm this view. At least a considerable number of cases of mesioclusion are distinguished by the mandible exhibiting a greater increase in growth



than the maxillæ. In normal cases, as shown by Keith, Campion and Brash, the combined apposition and resorption effecting the growth of the jaws in a sagittal direction is dimensionally the same in this sense, that the occlusion is not changed mesiodistally beyond the limit of the normal. But in some cases of mesiocclusion the growth of the maxillæ is over-compensated by the growth of the mandible and the body of the mandible with its dental arch advances forward in relation to the maxillæ.

Campion and Keith are of the opinion that in such a definite pathological phenomenon as acromegaly the sites of growth are the same as in normal cases. In conformity to this view it seems probable that in cases of mesiocclusion or "progenie" the super-normal growth consists in an active remodelling of the bone in those sites in which the horizontal growth of the mandible normally takes place.

Now, do we know anything about the causes of the horizontal growth of the mandible? We have long since known that certain local stresses effect certain changes in bone surfaces, pressure causing resorption and tension causing apposition. But both these processes are also results of endocrine activity. An instance of the capacity of this latter factor of dominating over local apposition has been given by Brash, who describes how, in the pig, in the area between the orbital margin and the opening of the infra-orbital canal, "the general forces at work in modelling the bones are greater than any local influence that may be exercised on the growing bone by the pull or the growth of the muscles."

We have not yet discovered the reason for the relative ease with which in cases of distocclusion the lower arch can be made to move forward as rapidly as, for instance, in the case Fig. 3-4, seven millimetres in eight months. It seems highly improbable that the forward movement is caused by a rapid horizontal growth of the mandible with apposition at the posterior border, etc., set going by the use of intermaxillary rubbers. And if even this is improbable, that the increase in function that could be imagined as resulting from the use of intermaxillary rubbers, should be able to exert such a powerful influence on the horizontal growth of the mandible, then it must seem still more strange that a similar acceleration of growth does not occur in the maxillæ.

We thus arrive at the conclusion that the excessive mandibular growth in certain cases of mesiocclusion is not functional, if we define functional bone growth as a growth caused by a certain intensity of muscular function, and which accordingly would not take place if this intensity was not attained. But if it is not functional it must be a result of what Brash calls the "general forces at work" and in that case it must be a result of endocrine activity.

Only a very mechanical view of the orthodontist's problems can claim that it is possible to prevent the endocrine secretion from influencing the growth of the mandible by means of mechanical methods, traction and pressure strains on the teeth and the like. The very definite assertions in this direction have not been accompanied by any real clinical evidence. Although decades have passed since these assertions were first made, and there has consequently been ample time to collect material to prove the final results, this has been omitted.



A similar remark must also be made concerning another theory, that of Rogers, that in cases of mesiocclusion the corrected occlusion may be secured by means of muscle exercises. Unless these exercises can influence the endocrine activity itself, which *a priori* seems very improbable, this method to treat mesiocclusion must be without the result we expect. A temporarily and locally active force may certainly counteract and neutralise the result of another force. But if the activity of the latter is continuous and remains active after the former has become passive, it will in the long run prevail.

A critical review of the material that has been published concerning the results of the orthodontic treatment of mesiocclusion must lead to the conclusion that even a very early treatment may be without the desired final effect. Nevertheless, we find in textbooks and published articles so many recommendations of the early treatment, that there is much to excuse the inexperienced practitioner if his treatments prove failures. To be on the safe side the operator is advised before starting the treatment of an early case of mesiocclusion, to inform the patient that his case may be of a progressive character. But as it is impossible to make a reliable estimate of the final degree of the deformity, an early treatment has certain chances to succeed. The operator ought not to take the responsibility for the final result, as the cause of a failure is not to be found in the technical execution but in anatomical conditions beyond the reach of the mechanical treatment. I would also recommend that the operator inform the patient that we have at our disposal, as a last but very reliable resort, the surgical resection.

In the cases Figs. 27-28 and 29-30, the disharmony between the maxillæ and the mandible became worse during the treatment. In both cases we have an arrest of development in the incisal region of the maxillæ, so it is difficult to decide whether the disturbance is to be considered as a combination of opistognathism and progenie or opistognathism alone.

Besides the malocclusions we have as yet described there are several others of great interest: for instance, one characterised by a diminishing transversal width of the lower arch and another exhibiting progressive transversal growth. As it is not long ago since I gave descriptions of these malocclusions, we will pass them over this time. There are models of both these anomalies exhibited in the collection.

The views that have been presented in this paper will certainly not be endorsed by all the members of the Society I have been given the honour to address to-day. But I would like to call your attention to certain facts that seem to give an indirect support to the views I have presented. The extensive use of removable retainers, the tendency to resort to extraction, the desirability of using inconspicuous appliances, a result of the very protracted treatments—all these circumstances indicate that in a number of cases we have been, so to say, struggling with fate itself.

Regarding the responsibility for failures, the following may be said. In the majority of States the practice of dentistry is a legal monopoly, and the instruction in the art or at least the licensing body is in some way under the control of the State. The State has consequently a certain responsibility as to the competence



of the licensed practitioners. It is the licensed practitioner's duty to act in accordance with the instruction he has been given. If the result of his therapeutic action is something else than what it ought to be according to the official instruction, the fault is the State's, and the State ought to be the party to suffer for the results of its faulty teaching.

The student is now given the instruction that mesiocclusion and certain other anomalies ought to be treated at an early age, and that to postpone treatment is wrong. If an operator has acted according to this rule, and it is later discovered that the official position is wrong, he ought not to be made responsible for the result of the official teaching. As a matter of fact he has simply acted in accord with what at the date in question was supposed to be consistent with science and confirmed experience.

In a case of a judicial controversy between operator and patient where expert opinion has been consulted, the expert ought to stand by the operator, at least until we get a textbook with reliable information concerning the possibilities and limitations of orthodontic treatment.

In order to obviate the necessity of such an eventuality every careful operator should before starting treatment present a reservation with something like the following wording:—

“At present the possibilities of orthodontics are confined to local movements of the teeth. We have no evidence to prove that our operations will influence the region beyond the apical plane. The permanency of the result may consequently become more or less deranged by an abnormal development of this region. In cases in which the malocclusion is a manifestation of a developing jaw deformity, hereditary or not hereditary, the desired and perhaps temporarily attained result cannot be guaranteed.”

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## A FEW CASE REPORTS.

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By DR. AXEL LUNDSTRÖM.

THE British Society for the Study of Orthodontics did me the great honour of inviting me to read a paper at the December meeting. As lantern slides and photographs give a very poor impression compared with the models of the cases, and as I have been for many years past collecting models showing final results, it seemed it might be of some interest to exhibit some of these models at the meeting. The President of the Society kindly permitted me to do this, and the paper was accordingly accompanied by an exhibition of about one hundred and twenty models, showing a number of results as they were found several years after the removal of retainers. On account of the limited space and time for the reading of the paper, only a small number of these cases were included in the article. By the courtesy of the Society some of the remainder are published below.

CASE I, FIGS. 1 and 2.—This case is not a "jaw deformity." The maxillary and mandibular bases are of a size in harmony with the size of the dental arches when the teeth are in normal occlusion, if we except a slight crowding in the anterior portion of the mandibular arch. It is *not* to be diagnosed as postnormal occlusion, the antero-posterior malrelation of the buccal teeth having moved forward, giving an *appearance* of a "Class II condition." Being a "local" malocclusion, prognosis is good. Figs. 3 and 4 show the condition seventeen years after the removal of the retainers. The case has been re-examined recently, and the condition is the same, twenty-one years after the removal of all appliances.

The question is now, how are we to decide whether a case of this character ought to be considered as a "Class II" condition or not. It will perhaps be of some importance to discuss this problem, as apparently there were different opinions regarding this among the gentlemen who examined the models at the meeting. It is of a very great importance to know whether the mesio-distal malrelation in the premolar and molar region is due to a postnormal position of the lower arch or an anterocclusion of the upper buccal teeth, as the treatment will radically differ, and a faulty diagnosis will result in a complete failure.

The result of the treatment seems to me to prove that the diagnosis was correct. It was arrived at as follows: an examination of the general development of the denture and the form of the palatal vault show no indication of any arrest of development in the incisal region of the maxilla, the upper incisal curve and the approximal contact of the upper incisors indicating a sufficient "apical base" beyond their apices. The positions of the teeth in the lower arch showed a very slight crowding, in itself too insignificant to warrant orthodontic interference. The overbite was normal. The case was consequently diagnosed as a case with normal maxillary and mandibular bases, and the normal occlusion of the incisal teeth indicated that the antero-posterior relation of these bases was correct. Assuming this argument to be correct, the only conclusion that could be drawn as to the character of the "abnormal" in this case was this: the upper molars and bicuspid had travelled



in an anterior direction and had partly occupied the spaces for the upper cuspids.

It seems to me as if a diagnosis according to the Gnathostatical School of Dr. P. Simon might and in certain cases will result in a faulty treatment of malocclusions of this character. As has been shown by several authors, A. Wolfson, B. H. Broadbent and O. W. Brandhorst, the orbital plane is by no means constant in cases of normal occlusion, sometimes being anterior and sometimes being even considerably posterior to the upper cuspid.

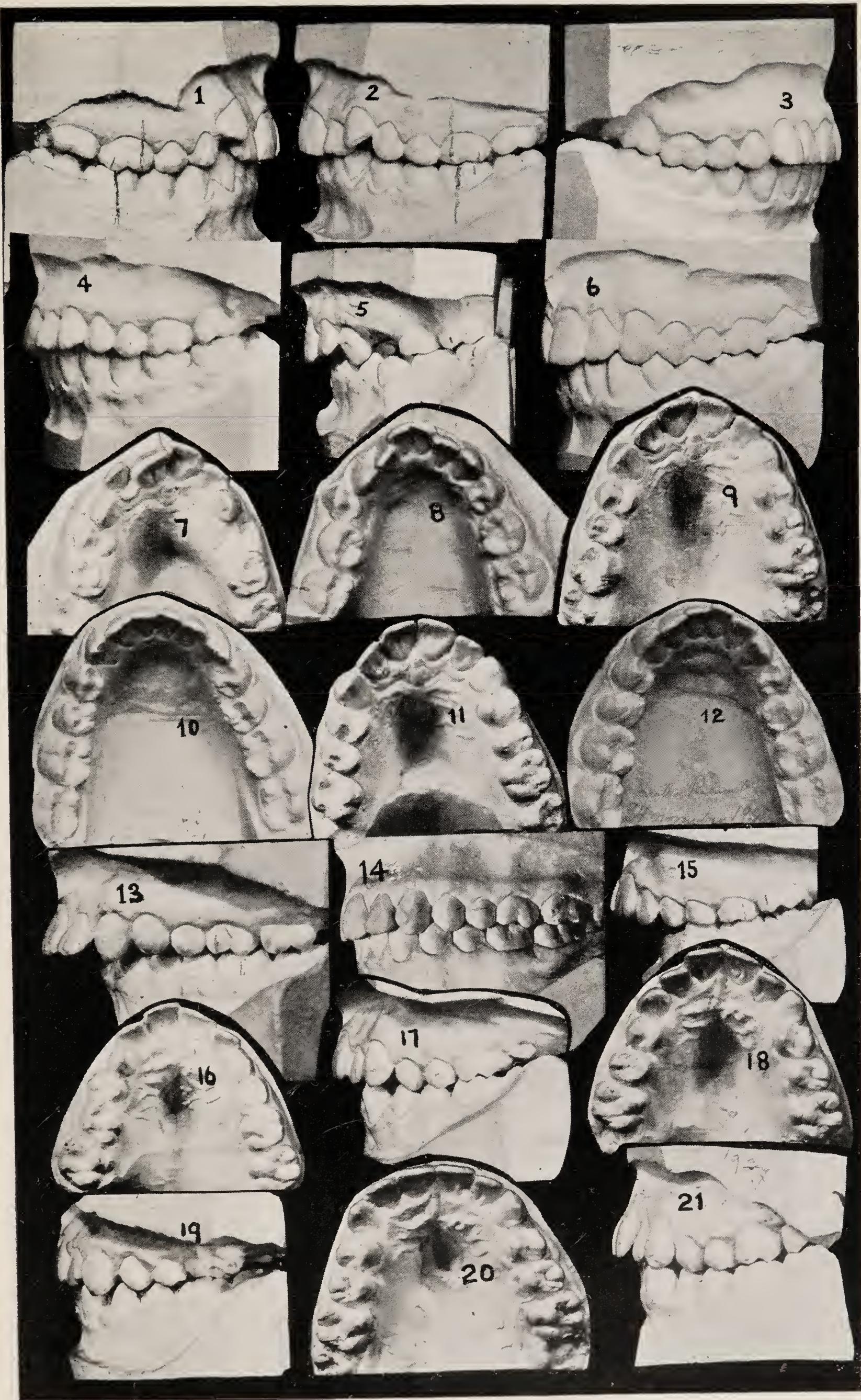
Simon himself is also well aware of the variability of the orbital plane. He states that material examined by Herzog show that this plane intersects the cusp of the cuspid in 45 per cent. of the cases. In 15 per cent. it intersects the cuspid between the mesial approximal surface and the cusp and in 17.4 per cent. between the distal approximal surface and the cusp. In 5 per cent. it intersects the premolar. Assuming that this proportion is found to obtain also in the most extensive material, we would in a number of malocclusion cases of the type just described (Figs. 1 and 2) find the orbital plane intersecting the lower arch in 45 per cent. at the distal surface of the cuspid, in 15 per cent. about half-way between this surface and the cusp of the lower cuspid, in 17.4 per cent. between the cusp and the mesial surface of the first lower premolar and in 5 per cent. still further backwards, as, for instance, at the point of contact between the lower premolars.

Treatment based on gnathostatic diagnosis would thus give correct results in 45 per cent. of the cases. But in 15 per cent. the treatment would aim at expansion forward of the upper incisors and a corresponding forward movement of the lower arch, and in 22.4 per cent. the treatment indicated would be a posterior movement of all the teeth, which would result in a complete ruin of the denture if, indeed, such an operation could be accomplished. This is according to the figures given by Simon himself. But if we use Brandhorst's material this last most undesirable result would to a far more extensive degree occur in 25 per cent. of the cases. And it is easier to imagine than describe what would ensue if this method were used for diagnosis in a malocclusion of this character in a type like that depicted by Broadbent in his Fig. 8 (see his article in the *Dental Cosmos*, August, 1927).

There is another point of interest in this case. It was treated at the age of 12, after the eruption of the twenty-eight permanent teeth. There has been a marked tendency in orthodontic practice to start treatment at an early age. If in treatment we include the conservation of the deciduous teeth, and if, as seems probable in this case, it was the early loss of a number of deciduous teeth that caused the malocclusion, then of course the early filling of them would have prevented the malocclusion. But if this had not been done, it seems to me as if the best time for the orthodontic interference was after the full eruption of all the upper bicuspid, as was done in this case. The active treatment was just five months, but if the treatment had been undertaken somewhat earlier, that is to say before the eruption of the bicuspid, some time would have been lost through having to open spaces for the erupting teeth.

FIGS. 5, 7, 8.—Crowded condition of the lower and secondary





Illustrating DR. LUNDSTRÖM'S Communication.







crowding of the upper arch. Right side slight postnormal occlusion. Left side full postnormal occlusion. Deep overbite in the incisal region. Figs. 9 and 10 show the immediate result and Figs. 6, 11 and 12 is the condition eight years after the removal of the retainers. Excepting the use of "Baker anchorage" no special attempt was made to raise the bite or retain the corrected overbite with any sort of bite plate.

The permanence of the result did not at the time seem to me in any way remarkable, as it was just what was to be expected after the Angle method of treatment. But having later found that the expansion of a crowded lower arch is often extremely difficult to retain, and is in fact impossible without some form of permanent retention, I have come to the conclusion that the crowded condition of the lower arch is in this case more coronal than apical, and that in all probability the basal portion of the jaw was not too small.

FIG. 13.—Case of postnormal occlusion in a patient 18 years old. Fig. 14 is the condition eight years after the removal of all retainers. Regarding the overbite, see report of the preceding case.

FIGS. 15, 16, 23.—Case of deep and narrow palatal arch, a crowded condition of the lower anterior arch combined with post-normal occlusion. In accordance with what is now considered good practice, treatment was started at about 8 years. At the time the relapse as illustrated in Figs. 17 and 18 was supposed to have been the result of insufficient retentions.

Treatment was started again, and the result as shown in Figs. 19, 20 and 24 was attained. In spite of careful attempts to retain the result the case relapsed again. Figs. 21, 22 and 25 show the condition fourteen years after the removal of the retainers. As I now have found from much experience with similar cases, we have no possibility of making results permanent without some form of permanent retention, as for instance with plates to be worn at nights. A postponing of the treatment and extraction of two maxillary bicuspids would probably have been much better. But an expansion, however early the age at which it is undertaken, will not effect a sufficient growth in the basal portion of the maxillæ.

The relapse in the incisal region of the mandible does not *appear* to be quite complete, but an examination of the inclination of the lateral incisors in Fig. 23 will reveal the fact that the apical space is not quite so limited as a superficial examination would seem to indicate.

FIGS. 26 and 29.—A case of crowding of the maxillary arch accompanied by bilateral postnormal occlusion. Figs. 27 and 30 is the condition immediately after the removal of the active regulating appliance. Figs. 28 and 31 show the final result, twelve years after the removal of the retainers. The mesiodistal relation has been successfully retained, whereas the condition of the maxillæ has partially returned. The patient had a twin sister with a maxillary condition that was very similar, but with neutroccclusion. Authorities on heredity are of the opinion that when differences are found in monochorial twins they are to be considered as non-hereditary peculiarities. According to this view this case would indicate that the distocclusion was non-hereditary, but the crowded condition of the upper arch might very well be hereditary.



If this argument is correct it would seem quite natural that the hereditary momentum, the crowding, could not be permanently corrected, whereas the non-hereditary momentum—the post-normal occlusion—could be definitely corrected. I have elsewhere (*Dental Cosmos*, October, 1925) discussed this more elaborately.

A CASE OF PERMANENT RETENTION.—Figs. 32, 35 and 38 illustrate a malocclusion in a patient about 14 years old. Left side postnormal occlusion, right side neutroccclusion. Left first lower molar had to be extracted. Fig. 39 shows the condition with a fixed retainer from cuspid to cuspid. It was intended, as was taught by Dr. Angle—the treatment had been started 1909—that the space resulting from the loss of the tooth should be retained by means of an artificial substitute, but this was never performed. The patient wore a retaining plate in the upper arch with a labial wire attached passing distally to the cuspids and lying close to the anterior teeth.

The fixed retainer was removed probably during the year 1911. Figs. 34, 37 and 40 show the present condition about sixteen years after the removal of the *fixed* retainer. Two years previously, 1925, the labial arch of the plate was broken and detached. But the patient was still—1927—wearing the plate at nights, and states that if it is left out two successive nights it requires some force to get it into place, and she asserts that during the past seventeen years it has never been out more than three successive nights.

When the fixed retainer in the upper jaw was exchanged for a removable plate to be worn only at nights, and the patient went abroad and all possibility of my following the case seemed lost, I told her to be very careful and not discontinue its use until everything indicated that it was not needed any more. But little did I expect at the time that this meant a retention period of seventeen years and probably much longer. For the patient will not by any means risk the teeth relapsing into anything like the original condition.

FIGS. 41 and 42.—This is a case of an extensive jaw deformity. It was operated by Dr. O. Aleman of Stockholm by the method described by him. Figs. 43 and 44 are from models two years after the operation was performed. The case was re-examined 1927 or four and a half years after the operation. The condition being identically the same as in Figs. 43 and 44, no new impression was taken. The facility with which Dr. Aleman performs these operations seem to me to indicate that they may be used with great advantage also in cases where the deformity is much less than in the case illustrated.

Mr. H. CHAPMAN opened the discussion as follows :—

Those who know Dr. Lundström's writings, even those who have heard no more than his paper this evening, recognise him as a man with a thorough knowledge of orthodontics—its practice and its literature. He is a competent critic and, last but not least, an earnest seeker after truth; as he tells us, he has been congratulated for his courage to exhibit his failures. We are indeed honoured by his presence this evening.

In orthodontic discussions it is particularly difficult to convey the exact mental picture that is in one's mind. Knowing Dr. Lundström as we do, I have not the least doubt that everything he says rests



on a very secure foundation and that any points I raise are due to my inability to see the picture that was in his mind when he wrote his paper. Whilst the paper is a critique of recent orthodontic beliefs, we may also glean from it what Dr. Lundström's beliefs are. One of these is that early treatment is advantageous, though he would appear to be doubtful of this in one part of his paper.

Dr. Lundström says that before laying down a rule for treatment, evidence of its reliability should be presented. I am unable to agree entirely with Dr. Lundström on that point. If it were possible to treat the same case by alternative methods, e.g. by fixed appliances, or by removable ones, or at 6 years of age or at 12 and so on, it might be possible to say that a certain procedure had advantages over another. Obviously such a course is not, and is not likely to be, possible. No, I think it is right that suggestions should be made, with supporting arguments, for the advancement of orthodontics in order that others may adopt them if they think fit. Those members of the profession who give such suggestions a trial will assist in their permanent establishment as rules for practice or in their rejection. Subsequently data should be published on the merits or demerits of the beliefs advocated. Would Dr. Lundström tell us the age of the patients in Figs. 1-2, 3-4, and how long was the retention continued? Presumably they are about 12 years of age. Personally I would much prefer to have treated both cases earlier for these reasons:—

(1) The majority of the permanent teeth would erupt in their correct positions instead of having to be moved into them.

(2) At six years there would be more deciduous teeth than permanent teeth present; risk of caries and periodontal trouble in the latter would be reduced very considerably.

If Dr. Lundström does not believe in early treatment is there any limit to the age at which he would undertake the treatment of the first two cases he has shown this evening? What are his reasons for delay beyond facility in handling the patient? The essayist has referred to the possibility of treating cases unnecessarily as one of the points against early treatment; this may have been done as a result of incorrect diagnosis, or inability to foresee the future growth of a denture. The probability of such treatment being undertaken in this country seems to me extremely small. I have no hesitation in saying that many more errors are made in delaying treatment (Figs. 1 and 2) than in beginning it too early. There are many cases in which severe malocclusion in the permanent denture may be diagnosed with certainty in the deciduous dentition. By all means leave doubtful cases to the future.

Dr. Lundström has used the expression "stimulating growth"—presumably taken from other writers. To me it seems doubtful if it is possible to stimulate growth of the maxilla or mandible by orthodontic appliances; we may be able to influence the shape, the size to some extent, and the position of these bones. I believe, too, these operations have a similarity to certain (not to all) orthopædic operations, e.g. that for bow legs, in which conditions the histological character of the bone is normal and not pathological.

Under the heading "distocclusion" the essayist speaks of extraction of the first maxillary premolars in certain cases; I agree with him but would go even further. I am inclined to the belief that in both Class II and Class I cases, in which the region beyond the apical plane in the maxilla is too small—markedly too small—then the removal of these teeth is the correct treatment when the patient is 10 years of age and older. I am not prepared to say it should be done in younger children.

There is one point upon which I should like Dr. Lundström's opinion: is there such a thing as deficient or excessive alveolar growth; if alveolus is dependent on teeth, is there any evidence of its deficiency or excess where all the teeth are present in the cases we meet in daily



practice? In a case of normal occlusion, suppose that the apical plane is in one and the same horizontal plane in the mandible. In a case of excessive overbite due to lack of vertical growth in the molar region, is it the body of the bone that is at fault or is it the alveolar process? If it is the former, then the apical plane no longer lies in one horizontal plane and the error is not a deficiency of alveolar bone but of the basilar bone; or is it Dr. Lundström's view that this distinction between the two areas alveolar and basilar is impracticable? I ask this question because I have inferred from the paper that Dr. Lundström's view is that the apical base is always in one and the same horizontal plane. I have not had an opportunity to look the point up in the essayist's monograph on "The Apical Base." A record of the condition of these cases of excessive overbite when edentulous would be interesting.

I agree with the reader of the paper that it is most desirable to anticipate the effect and result of treatment and to inform parents what this is likely to be before the treatment is begun. They should also be told that in all but a few cases considerable improvement is to be expected. If the prognosis is bad it is better that treatment be not undertaken.

Cases, then, fall into one of three categories:—

- (1) Treatment not desirable. Cases in which the prognosis is bad.
- (2) Treatment by extraction—
  - (a) Alone.
  - (b) In combination with appliances.
- (3) Treatment by appliances without extraction.

} Cases in which the  
prognosis is reason-  
ably good.

The suggestion that data be collected to show in which category any case should be placed is one that the profession will endorse, and would probably do more than any one thing to advance the practice of orthodontics. The cases which have been shown this evening lend support to the view I expressed at the last meeting—that each case in its behaviour during and after treatment is a law unto itself.

Dr. Lundström says we have been struggling with fate itself; probably no one will disagree, but as a profession are we not responsible for this, and do not Bacon's words describe our position: "Facility to believe, impatience to doubt, temerity to answer, doubt to contradict have been the things which have forbidden the happy match between the mind of man and the nature of things"?

We are greatly indebted to Dr. Lundström for his stimulating paper.

Mr. FRIEL also thanked Dr. Lundström for his remarkable paper. Dr. Lundström, he added, was quite right when he said that appliances had been evolved without any knowledge as to their capabilities, except that they moved teeth. The knowledge of the growth of bone was very fragmentary, and there was a very large field to be covered before orthodontists could understand abnormal growth. There were two or three points on which he wished to touch in Dr. Lundström's very comprehensive paper. He thought there was some evidence as to forward movement of teeth in the bone. The recent work of Brash on the growth of alveolar bone, and the work of Stein and Weinmann on the physiological movement of the teeth in adult jaws, showed that bone was deposited on the posterior wall of the socket and was absorbed on the anterior wall of the socket. If there was an analogy between the growth of alveolar bone in pigs' jaws and the changes in the relation of the lower deciduous teeth to the upper deciduous teeth in children from 3 to 6 years of age, he thought it was a fair indication that the early treatment of inferior post-normal arch relationship, distocclusion cases, was desirable. The septa between the teeth, he thought, was no interference to forward movement, as was evidenced by the drifting of teeth following extraction. There was some force that moved teeth forward. It was nothing that shoved them from behind; they seemed to come forward of their own accord, without that. Dr. Lundström, he thought, was a little severe in his condemna-



tion of function and its relation to the growth of bone. He cited cases of ankylosis, but not the date of the onset of that condition, and also cases of congenital absence of teeth, where undoubtedly the function was considerably diminished—the jaw function. Perhaps he had misunderstood Dr. Lundström, but he did not seem to realise that the jaw muscles were only one group of muscles, and that as Dr. Sim Wallace had pointed out many years ago that the tongue muscles might be of equal importance or of greater importance in the stimulation of growth of alveolar bone. In his own practice he (the speaker) had had cases where there was a super-normal tongue, super-normal in size, either due to greater muscularity or due to an excess of fibrous tissue in the tongue; and in those cases there was a super-normal arch with spacing between the teeth—he did not think there was any question about it—and the reverse condition, of a sub-normal tongue, seemed to be related to a sub-normal arch. The most marked example he had seen was the case shown by Mr. Watkin before the Society a couple of years previously, where the tongue was almost absent, and where the distance between the two first lower molars was about half an inch, as far as he remembered. Dr. Lundström had referred to the Eskimo, and had expressed the view that that was not a true example of excess of function, stating that if there was a real excess of function there should be an enormous face and jaw. He disagreed with Dr. Lundström there. He thought the Eskimo did exhibit that excess of function. One got the eversion of the mandible, the wear of the teeth, the shallow glenoid fossa and the great vertical depth of the mandible, both in the incisor region and in the molar region, as well as great bulk; whereas in the modern civilised person you get the narrow arches, the small attachment for the muscles, deep glenoid fossa, and the reduction in the vertical depth of the mandible. He did not for an instant think that exercises alone were going to cure any malocclusion. He had thought so at one time, and he had tried faithfully for several years on some cases in his practice to cure them with muscle exercises alone, with absolutely no success; but he did think that they had their place in orthodontics in restoring function, to enable a child to chew, or to keep the lips closed. Cases had been shown in the literature which had been cured by muscle exercises, but cases had also been shown, especially by Dr. Hatfield of Boston, particularly during the discussion of Mr. Chapman's paper in New York the previous year, where malocclusion had been cured without any treatment of any kind; and he thought a lot of those cases which had been put down to muscle treatment might properly be attributed to nature itself. Dr. Lundström's statement that appliances did not influence the bone beyond the apical base seemed to be quite true. The rosy picture that used to be painted, that one could develop a person's chin in post-normal arch relationship cases had been unfortunately shattered in actual experience. The last point on which he wished to touch—and it was one, perhaps, on which he should not touch—was the etiology of inferior post-normal arch relationship, distocclusion cases. With the exception of cases that apparently were due to local causes, it seemed to him that it must be in some way related to endocrine disturbances. The type of lower jaw in a post-normal arch relationship case was just the opposite to what was found in acromegaly. In acromegaly one got this enormous increase in the horizontal, vertical and transverse width of the lower jaw, a great increase in the vertical growth of the maxilla, and a certain amount of transverse growth. In the post-normal case one got a reduction in the vertical and horizontal growth of the lower jaw, a reduction in the vertical height of the upper jaw, and a narrow upper arch. He thought Dr. Lundström's criticism of orthodontists for not showing their failures was quite just. It was no question of our not having failures, unfortunately, everyone had far too many of them, but he thought many orthodontists were not capable of understanding, as Dr. Lundström did, the probable causes



of those failures, or were unable to bring them together in a paper to show at a meeting. It was a difficult thing to show a failure unless one was able to correlate it with the probable cause. It really conveyed nothing to anybody else; but Dr. Lundström, in his failures, had conveyed a great deal to the Society; and he thanked him very much indeed.

Dr. SIM WALLACE joined with previous speakers in congratulating Dr. Lundström on his excellent paper. Before venturing to criticise the paper he wished to read the following extract from his book on the "Variations in the Form of the Jaws": "Another point in the prenatal development of the teeth may be here referred to. When the skull is about one and a half inches in length the mandible 'is represented by two frail troughs of bone, together forming a horseshoe-shaped arch'; the crypts for the various deciduous teeth are indicated by a series of indentations, and even at birth these crypts lie just above the lower border of the body of the mandible. . . . The bodies of the mandible and the maxillæ at a very early age are closely correlated in size with the size of the developing crowns of the teeth; and, secondly, the points in the mandible and maxillæ from which the teeth originate lie as it were at the maximum distance which the bones of the mandible and maxillæ allow of. Much importance has in recent years been laid on the position of the apical base of the dental arches, and if there is any lack of normal growth in the bones, so as not to carry the developing teeth, there might well be an insufficiently large apical base of the teeth in later life." Thus far, he was in complete agreement with Dr. Lundström. At the same time, from the very fact of the jawbone at the very early age being dependent on the size of the crowns of the developing teeth, it was almost impossible to get a non-correlation of the apical base with the teeth; that is to say, the teeth would have plenty of room in the jaw, since the jaw at that age did correspond with the size of the teeth. It must all be subsequent to birth that the defective growth in the jaws that led to irregularities of the teeth came on. If one took the evidence available, one found that the primary dental arch length (i.e. the same thing practically as what Franke called the primary alveolar arch-length), was always in direct proportion to the size of the crowns of the temporary teeth at first, but with advancing years, and particularly when a first molar tooth began to come into position, that primary dental arch-length was encroached on. The spaces that normally should exist or develop between the temporary teeth were crushed out, and one saw the first effect of such crushing by the obliteration of those spaces. It might go on still further, and the arch of the deciduous teeth might become quite visibly irregular from the crushing forward of the molar teeth from behind; and he thought that in practically all cases of crowding of the dental arch, the primary dental arch was encroached on, and one might almost say that all irregularities, at least all irregularities associated with general crowding, were due to the forward translation of the deciduous and first molar tooth, and that first molar could be translated still further forward by the second molar, and these two molars could be crushed still further forward by the eruption of the wisdom tooth if the jaw was too small—and it almost invariably was too small in civilised people. The fact that the deciduous molars were crushed forward was further emphasised by illustrations taken from Sir Frank Colyer's book on "Dental Surgery and Pathology," together with the agreement in his own on the "Variations in the Form of the Jaws." He thought that the cause of the whole trouble was lack of function in very early life. From the posterior border of the mandible and towards the angle one got the pressure strains, and consequently one got the deposition of bone. If one got the deposition of bone, the whole already formed body of the jaw must necessarily be carried forward. If it was not carried forward, there was going to be trouble with the teeth that were erupted between the teeth in front and the ascending ramus,



and there was going to be tissue, soft tissue he admitted, that was continually pushing the hindmost molar forward; and the upshot of all that was, as regards treatment, there was only one way, unless one knew how to make up for the growth that should have taken place in early life—and that knowledge was not available—there was only one rational method, and that was the extraction of teeth; at least, that was his view.

Mr. H. C. VISICK said he noticed an apparent discrepancy in the two paragraphs on hereditary conditions. He saw that Dr. Lundström said: "An hereditary variation is not a result of the surrounding conditions, is consequently not due to a pathological process that has arisen from external effects," etc. In the next paragraph he said: "It seems probable that the changed position of the teeth could not be maintained without some form of permanent retainer, because the original condition was the only one the anatomical and physiological *milieu* would tolerate." It seemed to him that there was a fallacy there. In one case it was hereditary, and it was not a result of the surrounding conditions, and the next paragraph seemed to say that it was the only condition that would be tolerated by the surrounding tissues. It seemed to him that the sort of primary hereditary cases were almost cases of predestination: one could not see any reason why, except that the child was the child of the parent, and had the same form of jaw, the same size of teeth, without any apparent cause—it was just a plain, clear, hereditary case. The other case was where there was some predisposing cause, where there was an hereditary disposition to some pharyngeal or nasal obstruction, and that led to an irregularity of the teeth, and so one found the same hereditary irregularity of the teeth in the parent and the child, but the irregularity was due to something further back.

Mr. ROBERT LINDSAY said he would like to take the opportunity of recalling a very pleasant meeting with Dr. Lundström at the Orthodontic Congress in New York, and to join with the other speakers in thanking him for his contribution to the *Transactions* of the Society. He did not propose to indulge in any remarks upon the details of the cases which had been under discussion, but he agreed with Mr. Friel that a very large amount of the cause of such relapses or such disappointment as might have been the lot of those who practised orthodontics had been due to a lack of knowledge of the development and growth of bone, and of its continued influence after orthodontic treatment had been completed. He thought that was a very happy remark of Dr. Lundström's, that mechanical practice had "bolted." It indicated the extraordinary exaggeration which had been given to the mere mechanical moving of teeth, and the lack of attention which had hitherto been given to those silent influences of growth which really determined so much in connection with orthodontic as with all other treatment. The point which he thought would have evoked the most interesting criticism was the matter of responsibility for relapses which might take place after orthodontic treatment; it was most refreshing to learn that Dr. Lundström would have the State held responsible for such relapses. That might constitute an argument in favour of the State control of dentistry which might commend itself to many members of the Society who looked with horror upon that conception; but, on the other hand, he conceived that if the State could be convinced that it would be held responsible for those errors of orthodontists, then State dentistry might be relegated to the Greek kalends. He himself would very much prefer to see the operator continue, in the future as in the past, to shoulder the responsibility, so far as this country at least was concerned. The student of dentistry got only the rudimentary elements of his orthodontic practice in his course of study; all that was of practical value to him came from post-graduate experiences and instruction. It was at the meetings of such societies, in the demonstrations which were given at their meetings, and in the application



to his own cases of his growing scientific knowledge, that the dentist obtained his mastery over his art, and he hoped that in the future it would continue to be so. Knowledge of the growth of bone and its effects upon practice—all practice, not only orthodontic—must be the study of the student and of the practitioner in future, and the dentist must rely upon that acquired knowledge for justifying his treatment of his cases. That was the only point he wished to notice, and he would conclude by remarking that in the extremely interesting and important paper to which the members had listened, he found Dr. Lundström in accord with the teaching which had been going on in that Society for some time, by those he had mentioned—Keith, Champion and Brash—and that by an intimate study of those great factors of growth they would be able to combine, with high mechanical dexterity, the ideal of orthodontic practice.

Mrs. LINDSAY said she wished to thank Dr. Lundström for his paper, which she had read with great interest, and to mention one or two points which occurred to her. One of them was that Franke suggested that according to Nature (the great orthodontist in the etymological sense of the term—the right or straight child) might be trying, by something which appeared to be an orthodontic defect, to remedy some grosser defect in a more important part of the skull; with her characteristic patience Nature waited until the retention apparatus was removed, and then said “As you were,” making operators raise their hands in despair and exclaim: “After all the time and trouble I have taken, the case has relapsed”; Professor Sir Arthur Keith attributed certain deformities to the expression of various stages in the evolution of the species, and specially mentioned cleft palate as being a stage in the shark period of evolution, and Dr. Schwartz also brought forward the case of a gorilla with mesiocclusion. This occurred in a wild creature, in natural surroundings, and therefore the condition could not be ascribed to civilisation. Professor Smith had recently suggested that the true study of biological anatomy was through comparative morphology, and that showed the wisdom of Sir John Tomes in insisting on the study of comparative dental anatomy as one of the compulsory subjects for the dental diploma, and she would emphasise that this study should be made compulsory for the study of orthopædics, because very little was known about the morphology of the teeth and jaws, and by studying comparative anatomy some light might be thrown on the subject. The Society ought to honour and be grateful to Dr. Lundström, because he had shown many pitfalls which might be avoided in teaching future students of orthodontics.

Dr. LUNDSTRÖM, in reply, thanked those who had complimented him on his paper, and said he would try to answer the various points which had emerged in the discussion, though it was rather difficult to express oneself in a foreign language. Dr. Chapman had asked concerning the cases 1, 2, 3 and 4. They had come so late to him that he had to begin where he found them. He would have treated them earlier, but he did not see any advantage in doing the treatment before the age of about 10 years, because if one had a child for seven or eight months of active treatment, that was not a very exacting treatment for the patient or for the operator, but if he started at 6 or 7 years of age, then he had to go on and keep on until the age of about 12 years. He had done a lot of work at that age, and had come to the conclusion that a number of malocclusions could be treated with greater comfort at a later age. The appliances on the small teeth were very troublesome. He had treated quite a number at an early age, but had left it off, and did not do it so often now. With regard to the time for retention in the cases 1, 2, 3 and 4, he would not be astonished if the retention had to be permanent, but probably that would be the same if he had treated the case very early. He had had very bad results from early treatment, and he had had very bad results from late treatment. He had a lot of models showing different ages. The cases



No. 1 and No. 2 were partly distocclusion and partly bi-maxillary crowding. Distocclusion, he thought, could be treated at a rather late age with very good results. In the small percentage of cases where it was not possible, he did not know if it would have been possible to get good results even at an early age. As to the evidence as to deficiency or excess, that was the same case as Mr. Friel spoke about—the early treatment of post-normal cases. (Diagram on blackboard.) This was a case of a post-normal occlusion, and a very great overbite, with spaces between the teeth. The distocclusion could be successfully treated. He considered distocclusion as a local affair that could be treated at any age almost, and that had been done in that case. What it was not possible to correct was the lengthening of the incisors, and it seemed to him that Professor Brash had shown the reason. There was growth going on *there* (indicating), and a lengthening, and if they were in a certain inclination after treatment, there was no possibility of preventing them growing *there* (explaining diagram). It seemed to him that it would be better to postpone the treatment of those cases until the age of 11 years, or something like that. He had treated a good many cases very early, but he had had the growth going on, corresponding with what Dr. Brash had shown. With regard to extraction in Class II cases, he thought Dr. H. Chapman had not quite understood what he meant. He thought that Dr. Chapman and he had the same idea, that extraction was only advisable when there was some sort of crowded position, and the upper basilar portions were too small. (Diagram.) There was another case he had shown where the bicuspid were in infraocclusion, and he had drawn them into occlusion. (Explaining diagram.) If there was the bad growth at the age of 12, one would expect that the same deficiency was active all the time during the vertical growth of the face, and that, he thought, was the reason why the case relapsed. Mr. Friel had spoken about the date of onset of the ankylosis case. He had been thinking of a case published by Dr. Kelsey, of Baltimore, where the individual had never been able to open the mouth, and the operation was performed at the age of 12 or 13 years—he did not remember exactly when—but the individual had never been able to function with the lower jaw, and Dr. Kelsey thought that that case was evidence of bad jaw growth as a result of non-function, and in the lower jaw there was the typical form of so-called micrognathism, and *here* (indicating on diagram) was a very bad condition. But Dr. Kelsey had not at all taken into consideration the fact that although the upper jaw was perhaps not of quite normal width, it was in any case very nearly so. Dr. Kelsey had not noticed that at all, and if function had that result, that the upper jaw expands, why did it expand so much as it did in this case with no function at all? Regarding the Eskimo skull, it seemed to him that the Eskimo skull just proved what he had said, because the Eskimo arches were not by any means broader than those of other different races, but the Eskimo seemed to be the race that used its teeth more than any other race, and the growth was like this (showing on diagram). Then there was the growth of the bone, as one found everywhere where there was a very good function, but the width was not greater, and there were many cases of Indians and barbarous people where the wear of the teeth was considerable, but the teeth were very irregular, and there was not sufficient room. With regard to the size of the tongue, he supposed the tongue had some influence, but it seemed to him difficult to believe that this could be a reason of the crowded condition of the teeth. He had seen cases of very large tongue, so large that it was considered necessary to cut out a section to prevent cancer occurring. There were very deep indentations in the sides of the tongue from the teeth. The tongue was becoming very large, but it had apparently not expanded the arch at all. Instead of that, there were indentations of the tongue. With regard to the etiology of distocclusion and its endocrine character, there might be some cases,



he believed 5 per cent. of cases, that were very difficult to treat. They might possibly be of an endocrine character, but in general that was not the case, he thought, because he had a case of monochoorial twins where one individual had neutroccclusion and the other had distocclusion. With regard to Dr. Sim Wallace's point, he was not prepared to now discuss the lack of function. As to the pressure of the third molar, no doubt the third molar did exert some pressure, but it seemed to him that it was not sufficient to account for the relapse of the cases, because in that case there would be a deranging of the mesio-distal occlusion. He had shown a case where there was a relapse after the extraction of the bicuspid. He was prepared to admit that there might be some pressure from the third molars, but he doubted if it were sufficient to crowd the denture. He did not think it was, because they had all seen a number of cases where the first molars had been extracted at a rather early age, and still there had been a crowded condition. With regard to Mr. Visick's criticism of his paper, in which there was an apparent inconsistency with regard to hereditary conditions, the expression he had used was not a very good one. He had meant that remark to apply to anatomical, topographic surroundings—that they were not large enough to accommodate the new position of the teeth. As Mr. Lindsay had said as to the question of responsibility, of course, the practitioner had the responsibility, but he was thinking of a number of cases that might have been treated according to what was considered proper, and if they relapsed, was it the operator's fault? It seemed to him that it was not the operator's fault. It would have been his fault if he had done the thing that he had not been taught, and it would be his fault if he had not done the right thing. If he had been doing what he had been taught to do, then he ought not to be held responsible for relapses. He had had a very troublesome case where the lower jaw grew and grew and got broader and broader, and the father of the child on receiving his bill came and asked him (the speaker) if he thought that the improvement was worth this sum. He had replied that it was not worth it at all, but that it was not his fault that the lower jaw grew like that; no one had told him that it would do it. The gentleman concerned was an officer in the Army, and he (the speaker) had drawn a parallel between the case of the dental practitioner and the military profession. He had said, "Supposing you were commanding an army of our country, and you suggested a certain operation that according to military science was the proper thing to do, and your suggestion was followed and the result was a great disaster to the army and to the State and to us all: would it not be very wrong of us if we said we should not give you any pay because you have given us very bad advice?" The officer had stared and looked at him as if he thought he was crazy, but afterwards he had seen that there was something in this contention. In the same way, he considered that if young operators followed the teaching provided by the State, in case of relapses where the young men got into trouble, the State ought to bear the responsibility.

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## VALEDICTORY ADDRESS OF THE PRESIDENT, Mr. H. C. HIGHTON.

LADIES AND GENTLEMEN,

As you are aware, it is customary at the annual meeting for the President to deliver his valedictory address, and the time has now arrived for me to vacate the chair, but having anticipated a full programme this evening I do not propose to make any very lengthy remarks.

The past year has naturally been a most interesting one to me, but I am afraid, as I foreshadowed in my inaugural address, that I have only revealed my many shortcomings.

I feel I must give expression to a personal opinion that each year only emphasizes the great amount of work which is necessary to unravel many of our problems, but I also feel confident that our Society is playing its part and taking a fair share in this work.

The apparent solution of many questions often appears to lead to further complications, but from a purely practical point of view the treatment of cases stimulated the evolution of various appliances until the choice was almost unlimited, yet even from this mass of material a simplification of method and ideas is perhaps resulting which renders treatment a little more practical.

Failures in treatment we know have been numerous, but we are also beginning to learn the lesson of our failures and to realise that the ideal is oftentimes only an ideal, and that compromise is more generally necessary.

We used to be accused of devoting too much of our time to the consideration of appliances and treatment ; we are now, however, extending our field of knowledge as regards causation. Here we have a study which we as members of this Society can never hope to see reach anywhere near the point of completion. There are so many factors involved, and influences at work, which at one time did not even enter our field of vision, and we now realise the importance of even one small gland and its effect upon development.

I do not propose to continue in this vein ; I am merely referring to generalities well known to you all, but I am sure this Society has always taken a very broadminded view of the whole subject of orthodontics and I trust it will continue on those lines.

Its work has prospered by such an outlook, and it will succeed in a greater measure by continuing its researches in the same broad manner of giving credit to each and every branch of the subject as having an important bearing on a thorough knowledge of etiology, development, diagnosis and treatment.

In conclusion, I wish to express my sincere thanks to the members of the Council and the officers for their support, and also particularly to the Hon. Secretary, who has all the responsibility for the success of the meetings and who has been very helpful to me.

I have a last and very pleasing duty to perform, and that is to welcome my successor Mr. Maxwell Stevens to the chair. He is a member of the Society well known to you all, whose qualifications for this office I need not enlarge upon, and under whose guidance I am sure the Society will be in safe and capable hands. I will now ask Mr. Maxwell Stevens to take the chair.



MINUTES of the proceedings of the annual general meeting held on Monday, December 5th, 1927, Mr. H. C. HIGHTON (President) in the chair.

#### MINUTES.

The SECRETARY read the minutes of the previous meeting, which were confirmed and signed.

#### ELECTION OF OFFICERS AND COUNCILLORS.

The PRESIDENT announced that the following officers and Councillors had been nominated by the Council, and that in the absence of any private nominations a ballot for their election was unnecessary. He therefore announced the election of officers, 1928, as follows:—

<i>President</i> ...	...	...	...	Mr. MAXWELL STEPHENS
<i>Immediate Past President</i>	...	...	...	Mr. H. C. HIGHTON
<i>Vice-Presidents</i> ...	...	...	...	Mr. A. T. PITTS
				Mr. H. E. MARSH
				Mr. BERTRAM SAMUEL
<i>Secretary</i> ...	...	...	...	Mr. A. L. PACKHAM
<i>Treasurer</i> ...	...	...	...	Mr. W. OVEY
<i>Curator</i> ...	...	...	...	Mr. L. F. FOURAKER
<i>Librarian</i> ...	...	...	...	Mr. BERTRAM SAMUEL
<i>Editor</i> ...	...	...	...	Mr. CARL SCHELLING
<i>Councillors</i> ...	...	...	...	Mr. H. G. WATKIN
				Mr. J. B. PARFITT
				Mr. H. R. EVANS

#### ELECTION OF AUDITORS.

Mr. SHARP and Mr. CROSS were elected Auditors for the ensuing year. The election of the former was proposed by Mr. CHAPMAN and seconded by Mr. NORTHCROFT, and of the latter by Mr. BERTRAM SAMUEL and Mr. J. H. BADCOCK.

#### TREASURER'S REPORT.

The Hon. TREASURER then read his report.

Mr. LIVINGSTON proposed, Mr. BADCOCK seconded, and it was agreed that the report should be received and adopted.

#### CURATOR'S REPORT.

The CURATOR read his report.

Mr. MARSH proposed, Mr. CROSS seconded, and it was agreed that the report should be received and adopted.

#### LIBRARY.

The LIBRARIAN announced that he had nothing to report.

#### HON. SECRETARY'S REPORT.

The Hon. SECRETARY read his report.

Mr. LINDSAY proposed the adoption of the Secretary's report.

Mr. H. CHAPMAN, in seconding, asked whether, before the decision was adopted as to offering another prize, the matter would be brought before the general meeting.

The PRESIDENT replied that he thought it would be wise to do so.

The Hon. SECRETARY's report was then adopted with unanimity.

The PRESIDENT extended the welcome of the Society to the distinguished guest of the evening, Dr. A. F. LUNDSTRÖM of Stockholm.



## INDUCTION OF PRESIDENT-ELECT.

The President-Elect, Mr. MAXWELL STEVENS, was formally inducted to the Presidential chair.

On the motion of Mr. G. NORTHCROFT a hearty vote of thanks to the retiring President and to the other officers was carried by acclamation.

The proceedings terminated at 10.25 p.m.

## HON. TREASURER'S REPORT.

During the past year the Society's income has been £292 15s. 8d., of which £210 11s. 6d. represents members' subscriptions, £80 surplus from the prize fund, and the remainder interest plus the proceeds of sale of *Transactions*. There is also an increment of £7 10s. on the National Savings Certificates and a further purchase of 100 Certificates has been made, representing a total present value of £253 15s. The Society also holds £35 on deposit for the Prize Fund and a balance in hand and at the bank of £85 3s. 5d., making a total of £373 18s. 5d.

## STATEMENT OF ACCOUNTS, 1926-27.

1925-1926.	INCOME.				1926-1927.
£ s. d.					£ s. d.
200 0 6	Members' Subscriptions	...	...	...	210 10 6
—	Arrears	...	...	...	0 1 0
1 10 11	Interest ...	...	...	...	1 5 3
—	Sale of <i>Transactions</i>	...	...	...	0 18 11
—	Transferred from Prize Fund	...	...	...	80 0 0
<hr/>					<hr/>
£201 11 5					£292 15 8
<hr/>					<hr/>

1925-1926.	EXPENDITURE.				1926-1927.
£ s. d.					£ s. d.
29 15 6	Rent and Epideascope...	...	...	...	25 0 0
28 10 8	Printing, General	...	...	...	35 8 1
33 0 5	„ Transactions	...	...	...	52 10 11
22 1 0	Reporting	...	...	...	21 0 0
1 2 6	Typing	...	...	...	—
2 8 4	Petty Cash	...	...	...	3 9 11
1 1 0	Refunded Subscription...	...	...	...	1 1 0
10 13 9	Library Account	...	...	...	1 6 0
3 2 6	Museum Account	...	...	...	—
10 10 0	Refreshments	...	...	...	10 10 0
30 0 0	Transfer to Prize Fund	...	...	...	30 0 0
—	Purchase of 100 Savings Certificates	...	...	...	80 0 0
0 1 2	Bank Debits	...	...	...	0 1 5
					<hr/>
29 4 7	Credit Balance	...	...	...	260 7 4
					32 8 4
<hr/>					<hr/>
£201 11 5					£292 15 8
<hr/>					<hr/>

We have examined the Books and Vouchers and find the above Statement of Accounts to be correct.

A. LIVINGSTON.  
L. F. FOURAKER.  
*Hon. Auditors.*



















